



SRI VENKATESWARA UNIVERSITY
II Year Syllabus for 4-Year UG Honours in BCA. (Artificial Intelligence) as
Major
in consonance with the Curriculum framework w.e.f. AY 2026-27

II Year IV Semester

Sl. No.	Category	Course No.	Course Name	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
				Theory	Practical		Theory	Practical	
1	Major-Core	8	Python Programming	3	2	5	3	1	4
2	Major-Core	9	Prolog Programming	3	2	5	3	1	4
3	Major-Core	10	Artificial Intelligence for Games	3	2	5	3	1	4
4	Minor	2		4	0	4	4	0	4
5	MDC	3	-	2	0	2	2	0	2
6	SEC	4	SEC: Design Thinking/Problem solving/ others	2	0	2	2	0	2
				17	6	23	17	3	20

Note:

The number of instructional hours shall be five (5) for courses involving problem-solving, and four (4) for courses comprising only theory.


 (A. Ravi Prasad)
 CHAIRPERSON
 BOS (PASS) IN COMPUTER SCIENCE
 S.V. UNIVERSITY
 THIRUPATI



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II Year Syllabus for 4-Year UG Honours in BCA Artificial Intelligence as Major in consonance with Curriculum framework w.e.f. AY 2026-27

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	IV	8	Python Programming	3	3
			Python Programming Lab	2	1
		9	Prolog Programming	3	3
			Prolog Programming Lab	2	1
		10	Artificial Intelligence for Games	3	3
			Artificial Intelligence for Games - Lab	2	1

(A. Ravi Prasad)
CHAIRPERSON
BOS (PASSIVE) COMPUTER SCIENCE
S.V. UNIVERSITY
THIRUPATI

SEMESTER-IV
BCA. (Artificial Intelligence)
COURSE 9: Prolog Programming

Theory

Credits: 3

3 hrs/week

Course Objectives:

- To introduce the fundamentals of logic programming and the declarative paradigm using Prolog.
- To develop understanding of facts, rules, recursion, and query processing in Prolog.
- To explore list processing, operators, arithmetic, and structured data handling.
- To understand control mechanisms such as cut, negation, and backtracking control.
- To enable students to write efficient, well-structured Prolog programs using advanced built-in predicates.

Course Outcomes:

At the End of the Course, The Students will be able to:

- Define facts and rules to model real-world relationships and demonstrate recursive rule definitions.
- Interpret declarative and procedural meanings of Prolog programs and analyze execution order.
- Develop Prolog programs using lists, operators, arithmetic operations, and structured data.
- Apply control mechanisms such as cut, negation, and file handling for controlled execution.
- Construct efficient Prolog programs using term manipulation, aggregation predicates, and debugging techniques.

UNIT - I

An example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers questions, Declarative and procedural meaning of programs.

UNIT - II

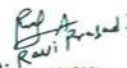
Data objects, Matching, Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic.

UNIT -III

Lists, Operators, Arithmetic:: Representation of lists, Some operations on lists, Operator notation, Arithmetic. Retrieving structured information from a database, Doing data abstraction, Simulating a non deterministic automaton, Travel planning, The eight queens problem.

UNIT-IV

Preventing backtracking, Examples using cut, Negation as failure Problems with cut and negation Input and Output: Communication with files, Processing files of terms, Manipulating characters, Constructing and decomposing atoms, Reading programs: consult, reconsult.


(A. Ravi Prasad)
CHAIRPERSON
BOS (PASS) IN COMPUTER SCIENCE
S.V. UNIVERSITY
THIRUPATI

UNIT-V

Testing the type of terms, Constructing and decomposing terms: arg, name, Various kinds of equality, Various kinds of equality, Control facilities, bagof, setof and findall. General principles of good programming, How to think about Prolog programs, Programming style, Debugging, Efficiency.

Text Books:

1. Programming in Prolog, William F. Clocksin and Christopher S. Mellish, Springer.
2. Prolog Programming for Artificial Intelligence, Ivan Bratko, Pearson Education.

Reference Books:

1. The Art of Prolog, Leon Sterling and Ehud Shapiro, MIT Press.
2. Learn Prolog Now!, Patrick Blackburn, Johan Bos, and Kristina Striegnitz.
3. Prolog and Natural Language Analysis, Fernando C.N. Pereira and Stuart M. Shieber, CSLI Publications.

Activities:

UNIT – I

(Family Relations, Rules, Recursion, Declarative and Procedural Meaning)

Outcome:

Students will be able to define facts and rules in Prolog, implement recursive relationships, and explain the declarative and procedural meaning of Prolog programs.

Activity: Family Knowledge Base with Recursive Relationship

Students will design a Prolog knowledge base representing a family structure. They will define facts such as male, female, and parent, and extend them using rules for father, mother, sibling, and grandparent. A recursive rule for ancestor must be implemented. Students will execute multiple queries and explain how Prolog resolves them step-by-step.

Evaluation Method:

Assessment will be based on correctness of facts and rules, proper recursive implementation, successful query execution, and clarity in explaining Prolog's execution process.

UNIT – II

(Matching, Clause Order, Procedural Meaning, Monkey and Banana Problem)

Outcome:

Students will be able to analyze Prolog's matching mechanism, understand the effect of clause and goal order, and model problem-solving tasks using logical rules.

Activity: Modeling the Monkey and Banana Problem

Students will represent the Monkey and Banana problem using states and transition rules in Prolog. They will demonstrate how goals are matched and resolved, and observe how changing the order of clauses affects execution results.

Evaluation Method:

Evaluation will focus on accurate state representation, correctness of transition rules, understanding of clause order effects, and explanation of procedural and declarative interpretation.

UNIT – III

(Lists, Operators, Arithmetic, Eight Queens, Travel Planning)

Outcome:

Students will be able to manipulate lists, apply recursion and backtracking, and solve constraint-based problems in Prolog.

Activity: Eight Queens Problem Using Lists

Students will implement the Eight Queens problem using list representation to model the board. They must demonstrate recursive solution generation and explain how Prolog's backtracking mechanism finds valid configurations.

Evaluation Method:

Assessment will be based on correctness of the solution, appropriate use of lists and recursion, demonstration of backtracking behavior, and explanation of logic used.

UNIT – IV

(Cut, Negation, Input/Output, File Handling)

Outcome:

Students will be able to control backtracking using cut, apply negation as failure, and perform file-based input and output operations in Prolog.

Activity: Controlling Backtracking and File Processing

Students will write two versions of a program—one using normal backtracking and another using cut to restrict it. They will apply negation as failure to solve a logical query and demonstrate file handling by reading and processing facts from an external file.

Evaluation Method:

Students will be evaluated based on correct use of cut and negation, demonstration of controlled execution flow, successful file handling, and explanation of their effects on program behavior.

UNIT – V

(Term Manipulation, Equality, Control Facilities, Aggregation Predicates, Debugging)

Outcome:

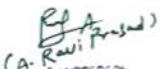
Students will be able to manipulate structured terms, apply different equality predicates, retrieve grouped data using aggregation predicates, and develop efficient Prolog programs.

Activity: Data Retrieval and Term Manipulation

Students will create a structured database (e.g., student(Name, Subject, Marks)) and retrieve information using bagof, setof, and findall. They will also demonstrate term decomposition using arg and compare different equality operators.

Evaluation Method:

Evaluation will be based on correct implementation of aggregation predicates, proper handling of structured terms, understanding of equality types, and clarity in explaining program efficiency and debugging techniques.


(A. Ravi Prasad)
CHAIRPERSON
BOS (PASSING COMPUTER SCIENCE)
S.V. UNIVERSITY
TIRUPATI

SEMESTER-IV

COURSE 9: Prolog Programming

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. **Family Relationship Program**
 - Define facts for parent, male, female.
 - Extend using rules for father, mother, sibling, grandparent.
 - Demonstrate recursive rule for ancestor.
2. **Understanding Prolog Execution**
 - Write a recursive program for factorial or Fibonacci.
 - Trace how Prolog answers queries step-by-step.
3. **Monkey and Banana Problem**
 - Implement the classic AI problem using state representation.
 - Demonstrate procedural and declarative meaning.
4. **Order of Clauses and Goals**
 - Write a program where changing clause order affects output.
 - Demonstrate matching and goal resolution.
5. **List Operations**
 - Write Prolog programs to:
 - Find length of a list
 - Reverse a list
 - Check membership
6. **Eight Queens Problem**
 - Implement solution using recursion and backtracking.
7. **Using Cut and Negation**
 - Write programs demonstrating:
 - Cut (!)
 - Negation as failure
 - Show how backtracking is prevented.
8. **File Handling in Prolog**
 - Write a program to:
 - Read terms from a file
 - Write output to another file
9. **Term Manipulation**
 - Use predicates:
 - arg/3
 - name/2
 - =, ==, =, := etc.
 - Demonstrate different types of equality.
10. **Aggregation Predicates**

Write programs using:

 - bagof
 - setof
 - findall
 - Compare outputs and explain differences.

(A. Ravi Kumar)
CHAIRPERSON
BOS (PRACTICE) IN COMPUTER SCIENCE
S.V. UNIVERSITY
TIRUPATI

BCA Artificial Intelligence Honours
II Year IV Semester
COURSE 9 : Prolog Programming

Time : 3 Hrs

Max Marks : 75

SECTION - A

Answer any FIVE of the following

5 X 3= 15 Marks

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

SECTION-B

Answer FIVE of the following.

5 X 12=60 Marks

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V

Ravi Prasad
(A. Ravi Prasad)
CHAIRPERSON
BOS (PASS) IN COMPUTER SCIENCE
S.V. UNIVERSITY
TIRUPATI