

[4]

a home, which is married and which has a high income. [7]

ID	Home Owner	Marital Status	Income	Defaulted?
1	Yes	Single	High	No
2	No	Married	High	No
3	No	Single	Low	No
4	Yes	Married	High	No
5	Yes	Divorced	High	Yes
6	No	Married	Low	No
7	Yes	Divorced	High	No
8	No	Single	High	Yes
9	No	Married	Low	No
10	No	Married	Low	Yes

- 5.(a) Explain the control structures in Prolog. With a definition of recursion, write a program in Prolog to find the factorial of a number and show its execution. [10]
- (b) Write the advantages of speech communication. Explain the process involved in speech recognition. [4]

OR

- (c) What do you mean by lists in prolog ? Discuss the following list manipulation operations with example. [10]
- (i) Concatenation of list.
- (ii) Reverse a list.
- (iii) Palindrome check of a list.
- (d) Explain the phases involved in knowledge acquisition process. [4]



III - S - M.Sc. - (Comp.Sc.) - CS - 3.1 -
(Artificial Intelligence) - (R & B)

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2024

Full Marks - 70

Time - As in the Programme

The figures in the right hand margin indicate marks.

Answer ALL questions.

- 1.(a) What is an intelligent agent ? What are its components ? Explain the structure and functions of simple reflex and model based agent. [7]
- (b) What is uninformed search strategy ? Explain the Breadth first Search Algorithm with its performance measures and compare it with other uninformed search strategies. Given the branching factor as 3 and the depth of the shallowest goal node as 4, Calculate the total number of nodes generated in Breadth First Search. [7]

OR

- (c) What is informed search strategy ? Explain the Best First search and A* Search algorithm for searching solutions with the properties of heuristic functions used. [7]
- (d) Describe the components of a problem. Define the 8-Puzzle problem ? Write the different heuristic function used in 8-puzzle problem. Solve the following 8-Puzzle problem using A* Search. [7]

[P.T.O...]

[2]

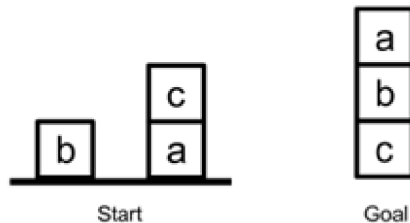
1	2	3
8	6	
7	5	4

(Initial state)

1	2	3
8		4
7	6	5

(Goal state)

- 2.(a) What is a Plan ? Explain the function of simple planning agent and the structure of an action schema with a suitable example. Write the STRIPS language representation of a Block world planning problem and write the plan for the Block World problem given as below. [10]



- (b) Explain the components and function of a knowledge based agent along with its major operations. [4]

OR

- (c) Consider the following knowledge Base.

"It is crime for a teacher to sell Question Papers to Students. Harish is a student and he has some Question Papers. All his Question Papers were sold to it by Rajesh, who is a teacher." [10]

- (i) Write the given Knowledge Base in first order logic.

[Cont...

[3]

- (ii) Prove that **"Rajesh is a Criminal"** using forward chaining in First order logic.
- (iii) Define unification with an example.
- (d) Write the components and inference rules of First order Logic. [4]
- 3.(a) What is an expert system ? Discuss the rule based architecture of the expert system. [7]
- (b) What is Natural Language Processing ? Explain the components and different steps involved in natural language processing with examples. Explain the components of Top down parsing and perform this parsing for the given sentence **"The Boy read this book"**. [7]

OR

- (c) Explain the components and structure of learning agent along with the different forms of learning. [7]
- (d) What is syntactic parsing ? Write the CFG for the English language. Explain the components of Bottom up parsing and perform this parsing for the given sentence **"The Tiger attacked the deer"**. [7]

- 4.(a) What is Vision ? Explain the operations, structure and processing stages of the computer vision systems. [7]

- (b) Explain the basic approaches of pattern recognition process. [7]

OR

- (c) What do you mean pattern recognition and classification ? Explain the different steps involved in the recognition and classification process. [7]
- (d) Consider the following dataset of 10 number of Loan borrowers. Here Defaulted is the class label. Using the Naïve Bayesian classifier, determine the class label of a new borrower which does not own

[Cont...