

GIDC DEGREE ENGINEERING COLLEGE
COMPUTER ENGINEERING DEPARTMENT
ARTIFICIAL INTELLIGENCE QUESTION BANK

Chapter - 1	
1	Define AI? Explain the characteristics of AI problem.
2	What is artificial intelligence? Define the different task domains of artificial intelligence.

Chapter - 2	
1	Describe different heuristics for the following types of problems: <ul style="list-style-type: none"> i. Blocks world ii. Tic Tac Toe
2	Analyze following problems with respect to the 7 problem characteristics of AI. <ul style="list-style-type: none"> i. 8-puzzle ii. Traveling salesman
3	Solve following cryptarithmic problem with appropriate strategy/steps: <pre> E A T + T H A T ----- A P P L E </pre>
4	Discuss hill climbing search method. Also discuss limitations and ways to overcome these limitations.
5	Discuss simulated annealing search method. Which types of problems are suitable to solve using this method? OR Explain simulated annealing algorithm.
6	Discuss A* algorithm. Give one example where it is suitable to apply. OR What do you mean by admissibility of an algorithm? Is A* algorithm an admissible one? When?
7	Discuss AO* algorithm. Give one example where AO* is suitable to apply.
8	Explain the State Space with the use of 8 Puzzle Problem.
9	Solve The following Crypt arithmetic problem: <pre> C R O S S + R O A D S ----- D E N G E R </pre>
10	Solve The following Crypt arithmetic problem: <pre> B A S E + B A L L ----- G A M E S </pre>
11	Given an example of a problem for which breadth-first search would work better than depth-first search. OR Explain depth first search (DFS) and breadth first search (BFS) with suitable examples. Why is depth limited search necessary in DFS?

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12	What is Hill Climbing? Explain Simple Hill Climbing and Steepest- Ascent Hill Climbing.																		
13	Solve Travelling Salesman Problem using any AI technique.																		
14	How problem characteristics help in the selection of AI technique? Explain these characteristics with possible examples.																		
15	<p>Consider the following initial and goal configuration for 8-puzzle problem. Draw the search tree for initial three iterations of A* algorithm to reach from initial state to goal state. Assume suitable heuristic function for the same.</p> <div><div>Initial state</div><table><tr><td></td><td>1</td><td>2</td></tr><tr><td>3</td><td>4</td><td>5</td></tr><tr><td>6</td><td>7</td><td>8</td></tr></table></div> <div><div>Goal state</div><table><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>8</td><td></td><td>4</td></tr><tr><td>7</td><td>6</td><td>5</td></tr></table></div>		1	2	3	4	5	6	7	8	1	2	3	8		4	7	6	5
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3	4	5																	
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1	2	3																	
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16	<p>Solve the following Crypt Arithmetic problem.</p> <p> D O N A L D + G E R A L D ----- R O B E R T</p>																		
17	<p>Solve Water Jug Problem using production rule system.</p> <p>OR</p> <p>What do you mean by state space representation of a problem? Illustrate how you can represent following water jug problem as a state space search: There are two jugs (without any measuring marks on them) of 4 and 3 liters capacity, respectively. There is a tap of water to fill the jugs. The objective is to fill the 4-liter jug with exactly 2 liter of water.</p>																		
18	Explain AND-OR graphs.																		
19	What do you mean by constraint satisfaction problems? Explain constraint propagation algorithm using suitable example.																		
20	What is production system? Explain it with an example. Discuss the characteristics of a production system.																		

Chapter - 3

21	Explain the different issues in Knowledge representation.
22	Explain different approaches of knowledge representation.
23	Differentiate between declarative and procedural representation of knowledge.

Chapter - 4

1	<p>Consider the following axioms:</p> <p>1. Anyone whom Mary loves is a football star.</p>
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	<p>2. Any student who does not pass does not play.</p> <p>3. John is a student.</p> <p>4. Any student who does not study does not pass.</p> <p>5. Anyone who does not play is not a football star.</p> <p>Prove using Resolution - "If John doesn't study, Mary doesn't love John." (imp)</p>
2	Explain the steps of unification in predicate logic. Also discuss the steps of converting predicate logic wffs to clause form.
3	<p>Consider the following facts.</p> <p>i) The member of the St. Bridge club are Joe, Sally, Bill and Ellen.</p> <p>ii) Joe is married to Sally.</p> <p>iii) Bill is Ellen's brother.</p> <p>iv) The spouse of every married person in the club is also in the club.</p> <p>v) The last meeting of the club was at Joe's house.</p> <p>1) Translate the above sentences into formulas in predicate logic.</p> <p>2) Prove that Ellen is not married.</p>
4	<p>Translate these sentences into formulas in predicate logic.</p> <p>1. John likes all kinds of food.</p> <p>2. Apples are food.</p> <p>3. Chicken is food.</p> <p>4. Anything anyone eats and isn't killed-by is food.</p> <p>5. Bill eats peanuts and is still alive.</p> <p>6. Sue eats everything Bill eats.</p>
5	Convert the formulas derived in above question (Question Number_4_ in this Question Bank) into clauses. Prove that John likes peanuts using resolution.
6	<p>Consider the following sentences:</p> <p>É Prince is a mega star.</p> <p>É Mega stars are rich.</p> <p>É Rich people have fast cars.</p> <p>É Fast cars consume a lot of petrol.</p> <p>(1) Translate these sentences into formulas in predicate logic.</p> <p>(2) Prove that Prince's car consumes a lot of petrol.</p>

Chapter - 5

1	Explain the Forward and Backward Reasoning.
2	Explain the algorithm of predicate logic resolution.
3	Using the formulas derived in in above question (Question Number_4_ in this Question Bank ó chapter - 4) prove John likes peanuts using forward chaining as well as backward chaining.
4	Justify using an example that Prolog uses Backward chaining to prove or answer any given goal.

Chapter - 6

1	Explain non-monotonic reasoning in detail.
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2	What is non-monotonic reasoning? Explain different subtypes of non-monotonic reasoning in brief.
3	Explain abductive reasoning using example.

Chapter - 7	
1	Explain Bayesian Network in detail.
2	Define certainty factor. How does certainty factor help in dealing with uncertainty? Explain with reference to rule based system.
3	Describe any one conflict resolution approach used in rule based systems.

Chapter - 8	
1	Explain Semantic Net in detail. Explain example of partitioned Semantic Net.
2	Explain Semantic Net and Frame with example. OR Explain followings: (i) Semantic net (ii) Frames
3	Represent following sentence using semantic net: 'Sita gave the pearl garland to Hanuman.'
4	What is Semantic Nets? Consider the following statements and draw the semantic net: Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in colour. Cats like cream. The cat sat on the mat. A cat is a mammal. A bird is an animal. All mammals are animals. Mammals have fur.

Chapter - 10	
1	What is linearly separable problem? Design a perceptron for any of such problem. State one example of a problem which is not a linearly separable.
2	Explain Min-Max search procedure with an example. OR Minimax is not good for game playing when the opponent is not playing optimally. Justify using suitable example.
3	Explain goal stack planning in detail.
4	Consider the game tree of Fig. 1 in which the static scores are from first player's point of view. Suppose the first player is maximizing player. Applying mini-max search, show the backed-up values in the tree. What move will the MAX choose? If the nodes are expanded from left to right, what nodes would not be visited using alpha-beta

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	<p>pruning?(Summer 6 2014)</p> <p style="text-align: center;">Fig. 1 (Game tree for Question 3(b))</p>
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Chapter - 11

1	Enlist the phases of natural language understanding. Describe the role of each phase in brief.
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Chapter - 12

1	<p>Explain each step of Natural Language Processing in detail.</p> <p style="text-align: center;">OR</p> <p>Explain steps of Natural Language Processing.</p>
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Chapter - 13

1	Discuss perceptron learning algorithm.
2	Write a short note on: Hopfield Networks.
3	What is an expert system? Explain Architecture of an Expert system.
4	<p>Explain perceptron learning algorithm for training a neural network. What are the limitations of this algorithm?</p> <p style="text-align: center;">OR</p> <p>Explain Artificial Neural Network.</p>
5	<p>Explain followings with reference to expert system:</p> <p>(i) Expert system shell</p> <p>(ii) Knowledge acquisition</p>
6	Write a short note on: Recurrent Networks.

Chapter - 14

1	Write a Prolog program to find the factorial of a number.
2	Explain Cut, Fail and Repeat predicates in Prolog.
3	Write a prolog program to find maximum number from a list.
4	Write a prolog program to find sum of all the numbers of a list.
5	<p>Write a Prolog program for finding a set, which is result of the intersection of the two given sets.</p> <p>Hint: Goal: intersect([1, 2, 3], [2, 3, 4], A)</p> <p style="margin-left: 40px;">A = [2, 3]</p> <p style="margin-left: 40px;">Goal: intersect([d, f, g], [a, b, c], X)</p> <p style="margin-left: 40px;">X = []</p>
6	Write a Prolog program to merge two sequentially ordered (ascending) lists into one ordered list.

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ARTIFICIAL INTELLIGENCE QUESTION BANK

	Hint: Goal: merge([1, 3, 5, 7], [0, 2, 4, 6], L) L = [0, 1, 2, 3, 4, 5, 6, 7] Goal: merge([a, c], [b, d], [a, b, c, d]) Yes
7	Explain following terms with reference to Prolog programming language: Clauses, Predicates, Domains, Goal, Cut, Fail, Inference engine
8	Explain how list is used in Prolog. Discuss how following list-functions can be implemented in Prolog: Checking membership of an item in a given list, concatenating two lists, and deleting an item in a given list.
9	Write a prolog program to reverse the given list.