Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VIII (NEW) EXAMINATION – WINTER 2020

Subject Code:2180703 Date:25/01/2021

Subject Name:Artificial Intelligence

Time:02:00 PM TO 04:00 PM Total Marks: 56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	What is artificial intelligence? Define the different task domains of artificial intelligence.	**03**
	(b)	Describe the production system.	**04**
	(c)	Explain state space representation for water jug problem.	**07**
Q.2	**(a)**	Differentiate prepositional & predicate logic.	**03**
	(b)	What is clausal form? How is it useful?	**04**
	(c)	Solve the following Cryptarithmetic Problem. SEND +MORE ---------- MONEY	**07**
Q.3	**(a)**	Define simulated annealing	**03**
	(b)	Define Non monotonic reasoning.	**04**
	(c)	Explain the Forward and Backward Reasoning.	**07**
Q.4	**(a)**	Define unification.	**03**
	(b)	How Knowledge is represented?	**04**
	(c)	Explain Inference Rules in Propositional Calculus.	**07**
Q.5	**(a)**	What is learning? What are its types?	**03**
	(b)	Write a PROLOG program to count total occurrence of a character in a given list of characters.	**04**
	(c)	Explain alpha-beta cut off search with an example. State a case when to do alpha pruning.	**07**

Q.6	**(a)**	Define Inductive Bias.	**03**
	(b)	Discuss the concept of LIST in prolog with suitable example.	**04**
	(c)	Explain steps of Natural Language Processing.	**07**
Q.7	**(a)**	Explain the difference between Boolean and Fuzzy Set membership using a suitable example.	**03**
	(b)	Discuss Bay's theorem.	**04**
	(c)	What is a "Semantic Net"? Illustrate 'property inheritance' in Semantic Network using "isa" and "instance" attributes.	**07**
Q.8	**(a)**	What is meant by Perceptron?	**03**
	(b)	Explain AO* algorithm.	**04**
	(c)	Explain Min Max procedure in game playing.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER VIII EXAMINATION- SUMMER 2020

Subject Code: 2180703 Date:26/10/2020

Subject Name: Artificial Intelligence

Time:02.30 pm to 05.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	What do you understand by Backtracking? What is natural advantage of Backtracking?	**03**
	(b)	Define the following words in the context of AI (i) Intelligence (ii) Knowledge (iii) Information (iv) logical reasoning	**04**
	(c)	Draw the state space for given problem. You have three jugs of capacity of 12 lietrs, 8 literss, and 3 liters. 12 liter of Jug is full of water while other two jugs are given empty. You have to obtain 2 liters of water in 12 liters of jug. You can pour the water on the ground. But no additional water is given. Formulate the state space for the given problem. Solve the problem and suggest the strategy.	**07**
Q.2	**(a)**	Discuss the concept of "Heuristic" with an example.	**03**
	(b)	How do you compare Hill climbing technique with A* algorithm.	**04**
	(c)	Solve the following cryptarithmetic problem. Every letter must be assigned unique digit between 0 to 9.	**07**

	W	I	R	E	
+	M	O	R	E	
M	O	N	E	Y	

OR

	(c)	Discuss Best first search technique.	**07**
Q.3	**(a)**	Briefly discuss Declarative and procedural knowledge.	**03**
	(b)	Represent the following sentences in first-order logic 1. Some students took English subject. 2. Every student who takes English passes it. 3. Every person who buyes policy is a smart. 4. No person buyes an expensive policy.	**04**
	(c)	Take any instance of 8 Puzzle problem and show its solution with A* algorithm.	**07**

OR

Q.3	**(a)**	Define Propositional and predicate logic.	**03**
	(b)	What are the primary problems with Hill climbing? Discuss	**04**

(c) For given following joint probability distribution of two Boolean variables, Find out the following probabilities? **07**

(i) P(Cavity)
(ii) P(~Toothache)
(iii) P(Cavity|Toothache)

	Toothache	~Toothache
Cavity	0.04	0.06
~Cavity	0.01	0.89

Q.4 **(a)** How do you define Artificial neural network? How does it learn? **03**

(b) What is the importance of Fuzzy logic? How do you perform union, intersection and complement operation on the Fuzzy sets? **04**

(c) Elaborate iterative deepening. **07**

OR

Q.4 **(a)** Explain the following terms **03**

(i) Semantic Nets (ii) Frames

(b) List out the property of Monotonic and Non monotonic reasoning. **04**

(c) Define Natural language processing and explain Discourse and Pragmatic processing. **07**

Q.5 **(a)** Discuss the concept of LIST in prolog with suitable example. **03**

(b) Write a prolog program which can list odd and even numbers from the given input list. **04**

(c) Simulate the working of Tic-tac-toe problem with Minimax technique. **07**

OR

Q.5 **(a)** List out the few properties of Prolog programming. **03**

(b) What is the purpose of fail predicate in prolog? Show the purpose with an example. **04**

(c) What do you understand by classification in Neural Network? Briefly explain perceptron algorithm and also narrate its limitation. **07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VIII (New) EXAMINATION – WINTER 2019

Subject Code: 2180703 **Date: 27/11/2019**

Subject Name: Artificial Intelligence

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Define the term "Artificial Intelligence". Explain how AI techniques improve real-world problem solving.	**03**
	(b)	What is the significance of the "Turing Test" in AI? Explain how it is performed.	**04**
	(c)	Enlist and discuss the major task domains of Artificial Intelligence.	**07**
Q.2	**(a)**	What is meant by "control strategy"? State the requirements of a good control strategy.	**03**
	(b)	Explain what is meant by "Production System" with respect to AI. Discuss the components of a Production System.	**04**
	(c)	Explain how a problem can be analyzed based on its characteristics. Analyze the game of "8-Puzzle" based on these characteristics.	**07**
		OR	
	(c)	Consider the Water Jug problem stated below: **Water Jug Problem:** "You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug? " Explain how this problem can be solved using State Space Search. Also, give the Production Rules to solve this problem and derive ONE feasible solution using the same.	**07**
Q.3	**(a)**	Explain why it is necessary to choose appropriate 'granularity' for knowledge representation.	**03**
	(b)	Differentiate between Breadth First Search and Best First Search.	**04**
	(c)	Explain the MiniMax search procedure for Game Playing using suitable example. What is the significance of Alpha and Beta cut-offs?	**07**
		OR	
Q.3	**(a)**	What is "iterative deepening"? How is it useful in time constrained search?	**03**

	(b)	Differentiate between Forward Reasoning and Backward Reasoning.	**04**
	(c)	Explain the algorithm for Steepest-Ascent Hill Climbing. Briefly describe the situations in which hill climbing may fail to find a solution.	**07**
Q.4	**(a)**	What is a heuristic? What care should you take while designing a heuristic function?	**03**
	(b)	Explain probabilistic inference in Bayesian Networks with the help of a suitable example.	**04**
	(c)	Consider the following facts: • Raghu likes all kinds of food. • Mangoes are fruit. • Cabbage is not fruit. • All fruits are food. Represent the above facts using Predicate Logic and use Resolution to prove that "Raghu likes Mangoes"	**07**
		OR	
Q.4	**(a)**	Explain the difference between Boolean and Fuzzy Set membership using a suitable example.	**03**
	(b)	Explain Problem Reduction using "AND-OR" graph.	**04**
	(c)	What is a "Semantic Net"? Illustrate 'property inheritance' in Semantic Network using "isa" and "instance" attributes.	**07**
Q.5	**(a)**	Enlist some applications of Neural Networks.	**03**
	(b)	Explain "Morphological Analysis" and "Syntax Analysis" in Natural Language Processing.	**04**
	(c)	Write Prolog programs to perform the following: i) Find the last element of a list ii) Merge two sorted integer lists L1 and L2 to generate a final sorted list L3. (For example, if L1= [1,3] and L2=[2,5,8], then L3=[1,2,3,5,8])	**07**
		OR	
Q.5	**(a)**	State the factors which may make understanding of natural language difficult for a computer.	**03**
	(b)	Write a note on non-monotonic reasoning.	**04**
	(c)	Demonstrate the use of 'cut' and 'fail' predicates in Prolog with the help of a suitable example.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2180703 Date:15/05/2019

Subject Name:Artificial Intelligence

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	What is Soft Computing?	**03**
	(b)	Describe Depth First Search.	**04**
	(c)	For the Water Jug problem, describe state space representation, actions, start and end state.	**07**
Q.2	**(a)**	Discuss limitation of hill-climbing method.	**03**
	(b)	What is heuristic function? Discuss with an example.	**04**
	(c)	Discuss A* algorithm. Also give one example to explain it.	**07**
		OR	
	(c)	Discuss Simulated Annealing search method. How is it different than greedy method?	**07**
Q.3	**(a)**	Discuss Fail in prolog.	**03**
	(b)	Differentiate with example representation of “Instance” and “Isa” relationships.	**04**
	(c)	Explain with example how choosing the granularity of representation and finding the right structure are crucial issues in knowledge representation?	**07**
		OR	
Q.3	**(a)**	Define epoch with respect to ANN.	**03**
	(b)	Write a PROLOG program to count total occurrence of a character in a given list of characters.	**04**
	(c)	What is wrong with the following arguments? • Men are widely distributed over the earth • Socrates is a man. • Therefore, Socrates is widely distributed over the earth. How should the facts represented by these sentences be represented in logic so that this problem does not arise?	**07**
Q.4	**(a)**	Discus perceptron.	**03**
	(b)	Explain Hopfield Network.	**04**
	(c)	Differentiate Fuzzy logic and Crisp logic. Also describe set operations on fuzzy and crisp logic.	**07**
		OR	
Q.4	**(a)**	Discus non-monotonic reasoning.	**03**
	(b)	Discuss various defuzzification methods.	**04**
	(c)	Discuss Nonlinear Planning using Constraint Posting with example.	**07**
Q.5	**(a)**	Write a prolog program to check whether or not given number is positive.	**03**
	(b)	Discuss Bayesian network and its application.	**04**
	(c)	Discuss min-max search method with an example.	**07**

OR

Q.5	**(a)**	Discuss Iterative deepening search method.	**03**
	(b)	Explain various steps of Natural Language Processing	**04**
	(c)	Define: Frames. Draw Semantic Net for following statements. a) Every kid likes candy. b) Every school going kid likes candy.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2180703 **Date: 26/11/2018**

Subject Name: Artificial Intelligence

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define and discuss different task domain of artificial intelligence.	**03**
	(b)	Explain Depth first search algorithm.	**04**
	(c)	Explain state space representation using water jug problem.	**07**
Q.2	**(a)**	Differentiate Hill climbing and Best First search method.	**03**
	(b)	Discuss the different approaches to knowledge representation	**04**
	(c)	What is production system? Explain it with an example. Discuss the characteristics of a production system.	**07**
		OR	
	(c)	Explain mean-end analysis approach to solve AI problems.	**07**
Q.3	**(a)**	Differentiate between Procedural and Declarative representation of knowledge.	**03**
	(b)	Justify using an example that Prolog uses Backward chaining to prove or answer any given goal.	**04**
	(c)	Explain the procedure to convert well formed formula to clause form with the help of example.	**07**
		OR	
Q.3	**(a)**	What do you mean by admissibility of an algorithm? Is A* algorithm an admissible one? When?	**03**
	(b)	Differentiate Monotonic and Non monotonic reasoning.	**04**
	(c)	Explain Resolution in predicate logic.	**07**
Q.4	**(a)**	Explain Semantic and Syntactic analysis in NLP.	**03**
	(b)	Discuss Alpha-Beta cutoffs procedure in game playing.	**04**
	(c)	List and explain the application of neural network.	**07**
		OR	
Q.4	**(a)**	Discuss Fail predicate in prolog.	**03**
	(b)	Write a short note on Semantic Net.	**04**
	(c)	Explain theory of Conceptual Dependency with the help of example.	**07**
Q.5	**(a)**	Differentiate Supervised and Unsupervised learning.	**03**
	(b)	Discuss Goal Stack Planning.	**04**
	(c)	Discuss how the following list function can be implemented in Prolog. 1. Append 2. Reverse	**07**
		OR	
Q.5	**(a)**	Explain following terms with reference to Prolog programming language: Clauses, Predicates, Domains	**03**
	(b)	Explain Bay's theorem.	**04**
	(c)	Explain Min Max procedure in game playing.	**07**

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Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2018

Subject Code: 2180703 **Date: 04/05/2018**

Subject Name: Artificial Intelligence

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	What is state space of a problem?	**03**
	(b)	Describe Breadth First Search. Comment on the optimalality of this method.	**04**
	(c)	In the Missionaries and Cannibals Problem, three missionaries and three cannibals must cross a river using a boat which can carry at most two people, under the constraint that, Number of cannibals should be lesser than the missionaries on either side. The boat cannot cross the river by itself with no people on board. For the above mentioned problem, describe state space representation, actions, start and end state.	**07**
Q.2	**(a)**	Describe heuristic function for the Travelling Salesman Problem.	**03**
	(b)	Discuss Turing Test.	**04**
	(c)	Discuss and Analyze Tower of Hanoi problem with respect to the seven problem characteristics.	**07**
		OR	
	(c)	Discuss Simulated Annealing search method. Compare it with hill climbing method.	**07**
Q.3	**(a)**	Discuss cut in prolog.	**03**
	(b)	Differentiate with example representation of “Instance” and “Isa” relationships.	**04**
	(c)	Explain with example how choosing the granularity of representation and finding the right structure are crucial issues in knowledge representation?	**07**
		OR	
Q.3	**(a)**	Discuss with example: Constraint Satisfaction Problem.	**03**
	(b)	Write a PROLOG program to find GCD of two numbers.	**04**
	(c)	Consider the following sentences: • Tennis is a game. Chess is a game. • John and Steve are students. • John plays Tennis. • Steve plays everything that John plays. • Students who play Tennis, do not play Chess. i. Translate the above sentences into formulas in Predicate logic ii. Prove using resolution that “Steve does not play Chess”	**07**
Q.4	**(a)**	Differentiate Fuzzy logic and Crisp logic.	**03**
	(b)	Explain Hopfield Network.	**04**
	(c)	Discuss Nonlinear Planning using Constraint Posting with example.	**07**

OR

Q.4 **(a)** Discus non-monotonic reasoning. **03**

(b) Discuss various defuzzification methods. **04**

(c) Explain following terms in reference to predicate logic Resolution. **07**

a. Unsuccessful attempt at resolution
b. Equality
c. Reduce
d. Trying several substitute

Q.5 **(a)** What is meant by Perceptron? Give one example. **03**

(b) Discuss Bayesian network and its application. **04**

(c) Write a PROLOG program Checking for Password. **07**

1. Give an opportunity to user to re-enter the password 'n' no. of times, on entering wrong password using Repeat predicate.
2. Give an opportunity to user to re-enter the password three (03) times, on entering wrong password.

OR

Q.5 **(a)** Consider the game tree given in Fig. 1, in which the evaluation function values are shown below each leaf node for the max player. Assume that the root node corresponds to the minimizing player. Assume that the search always visits children left-to-right. **03**

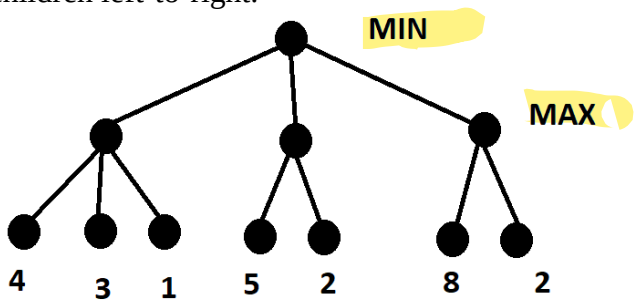

Fig : 1

Compute the backed-up values computed by the minimax algorithm by writing values at the appropriate nodes in the tree given.

(b) For the game tree given in Fig. 1, which nodes will not be examined by the alpha-beta pruning algorithm? Show the process of alpha-beta pruning to justify your answer. **04**

(c) Explain various steps of Natural Language Processing. **07**

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Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2180703 **Date: 29/04/2017**

Subject Name: Artificial Intelligence

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Consider the following initial and goal configuration for 8-puzzle problem. Draw the search tree. Apply A* algorithm to reach from initial state to goal state and show the solution. Consider Manhattan distance as a heuristic function (i.e. sum of the distance that the tiles are out of place.). **07**

Initial State

1	2	3
7	8	4
6		5

Goal State

1	2	3
8		4
7	6	5

(b) Explain non-monotonic reasoning in detail. **07**

Q.2 **(a)** Explain property inheritance algorithm with example. **07**

(b) Consider following facts. **07**

1. Every child loves Santa.
2. Every child loves every candy.
3. Anyone who loves some candy is not a nutrition fanatic.
4. Anyone who eats any pumpkin is a nutrition fanatic.
5. Anyone who buys any pumpkin either carves it or eats it.
6. John buys a pumpkin.
7. Lifesavers is a candy.

Use resolution and prove: If John is a child, then John carves some pumpkin.

OR

(b) Describe following facts into predicate logic. **07**

1. Every child loves Santa.
2. Everyone who loves Santa loves any reindeer.
3. Rudolph is a reindeer, and Rudolph has a red nose.
4. Anything which has a red nose is weird or is a clown.
5. No reindeer is a clown.
6. Scrooge does not love anything which is weird.

Q.3 **(a)** Explain difference between forwards reasoning and backward reasoning. **07**

(b) What do you understand by the term Fuzzy Logic? How is a fuzzy set denoted mathematically? **07**

OR

Q.3 **(a)** Define Frames. Draw Semantic Net for following statements. **07**

a) Every kid likes candy.

b) Every school going kid likes candy.

(b) Explain Bayesian Network in detail. **07**

Q.4 **(a)** Define Scripts. Write conceptual dependency for following statements. **07**

a) John flew to New York.

b) John shot Mary.

c) John ate eggs.

(b) Explain syntax and semantic analysis of natural language processing in detail. **07**

OR

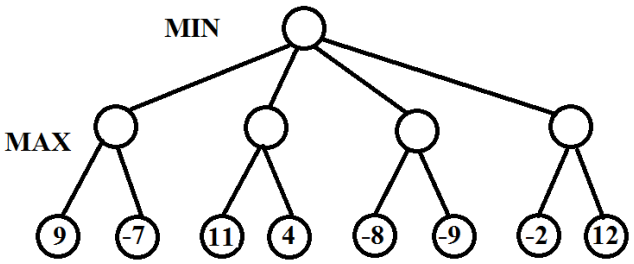
Q.4 **(a)** Explain connectionist models. What is perceptron? What is concept of back propagation for ANNs? **07**

(b) What is state space representation of a problem? Show the state space of the water jug problem. **07**

Q.5 **(a)** Write following prolog programs: **07**

i. To find the sum of first n natural numbers.
ii. To append List2 to List1 and bind the result to List3.

(b) We have two players: MIN who plays first and can make 4 moves, MAX who plays second and can make 2 moves. Suppose that after 1 turn, the values of the leaves are as in the figure : **07**



Compute (with the algorithm minimax) the value of the root of the tree, than say which is the most convenient move for MIN. Then tell with the reason, which parts of the tree are not generated if we perform an alpha-beta pruning.

OR

Q.5 **(a)** Write following prolog programs: **07**

i. To find the factorial of a positive integer number.
ii. To find the n^{th} element of a given list.

(b) Discuss hill climbing search method. Also discuss limitations and ways to overcome these limitations. **07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2180703 **Date: 02/11/2017**

Subject Name: Artificial Intelligence

Time:02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Describe different heuristics for the Blocks world problem.	**03**
	(b)	Discuss Cut and Fail in Prolog.	**04**
	(c)	Discuss with examples: AI Problem Characteristic.	**07**
Q.2	**(a)**	Discuss : Turing Test.	**03**
	(b)	Explain Best First Search method.	**04**
	(c)	What is wrong with the following arguments? • Men are widely distributed over the earth • Socrates is a man. • Therefore, Socrates is widely distributed over the earth. How should the facts represented by these sentences be represented in logic so that this problem does not arise?	**07**
		OR	
	(c)	Consider the following sentences: • Raj likes all kinds of food. • Apples are food. • Anything anyone eats and isn't killed by is food. • Sachin eats peanuts and is still alive. • Vinod eats everything Sachin eats. Now, attempt following: i. Translate these sentences into formulas in predicate logic ii. Use resolution to answer the question, "What food does Vinod eat?"	**07**
Q.3	**(a)**	Discuss limitations of Hill climbing search method.	**03**
	(b)	Explain non monotonic reasoning.	**04**
	(c)	Explain difference between forwards reasoning and backward reasoning.	**07**
		OR	
Q.3	**(a)**	Discuss steepest ascent hill climbing.	**03**
	(b)	Discuss various issues in design of search program.	**04**
	(c)	Define Frames. Draw Semantic Net for following statements. a) Every kid likes candy. b) Every school going kid likes candy.	**07**
Q.4	**(a)**	Discuss Bay's theorem.	**03**
	(b)	Discuss Simulated Annealing method of search.	**04**
	(c)	Explain alpha-beta cut off search with an example. State a case when to do alpha pruning.	**07**
		OR	
Q.4	**(a)**	Discuss Min-Max search method.	**03**
	(b)	Compare Fuzzy Vs Crisp logic and their membership function.	**04**
	(c)	Explain steps of Natural Language Processing	**07**
Q.5	**(a)**	What us Hopfield network?	**03**

	(b)	Write a prolog program to compute factorial of a given number.	**04**
	(c)	What is state space representation of a problem? Show the state space of the 8 puzzle problem.	**07**

OR

Q.5	**(a)**	Discuss algorithm for perceptron learning.	**03**
	(b)	Write a prolog program to find the sum of first N natural numbers.	**04**
	(c)	Discuss Iterative Deepening Search. Also give one example to explain.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2180703 **Date: 02/11/2017**

Subject Name: Artificial Intelligence

Time:02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Describe different heuristics for the Blocks world problem.	**03**
	(b)	Discuss Cut and Fail in Prolog.	**04**
	(c)	Discuss with examples: AI Problem Characteristic.	**07**
Q.2	**(a)**	Discuss : Turing Test.	**03**
	(b)	Explain Best First Search method.	**04**
	(c)	What is wrong with the following arguments? • Men are widely distributed over the earth • Socrates is a man. • Therefore, Socrates is widely distributed over the earth. How should the facts represented by these sentences be represented in logic so that this problem does not arise?	**07**
		OR	
	(c)	Consider the following sentences: • Raj likes all kinds of food. • Apples are food. • Anything anyone eats and isn't killed by is food. • Sachin eats peanuts and is still alive. • Vinod eats everything Sachin eats. Now, attempt following: i. Translate these sentences into formulas in predicate logic ii. Use resolution to answer the question, "What food does Vinod eat?"	**07**
Q.3	**(a)**	Discuss limitations of Hill climbing search method.	**03**
	(b)	Explain non monotonic reasoning.	**04**
	(c)	Explain difference between forwards reasoning and backward reasoning.	**07**
		OR	
Q.3	**(a)**	Discuss steepest ascent hill climbing.	**03**
	(b)	Discuss various issues in design of search program.	**04**
	(c)	Define Frames. Draw Semantic Net for following statements. a) Every kid likes candy. b) Every school going kid likes candy.	**07**
Q.4	**(a)**	Discuss Bay's theorem.	**03**
	(b)	Discuss Simulated Annealing method of search.	**04**
	(c)	Explain alpha-beta cut off search with an example. State a case when to do alpha pruning.	**07**
		OR	
Q.4	**(a)**	Discuss Min-Max search method.	**03**
	(b)	Compare Fuzzy Vs Crisp logic and their membership function.	**04**
	(c)	Explain steps of Natural Language Processing	**07**
Q.5	**(a)**	What us Hopfield network?	**03**

	(b)	Write a prolog program to compute factorial of a given number.	**04**
	(c)	What is state space representation of a problem? Show the state space of the 8 puzzle problem.	**07**

OR

Q.5	**(a)**	Discuss algorithm for perceptron learning.	**03**
	(b)	Write a prolog program to find the sum of first N natural numbers.	**04**
	(c)	Discuss Iterative Deepening Search. Also give one example to explain.	**07**

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Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2180703 **Date: 29/04/2017**

Subject Name: Artificial Intelligence

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Consider the following initial and goal configuration for 8-puzzle problem. Draw the search tree. Apply A* algorithm to reach from initial state to goal state and show the solution. Consider Manhattan distance as a heuristic function (i.e. sum of the distance that the tiles are out of place.). **07**

Initial State

1	2	3
7	8	4
6		5

Goal State

1	2	3
8		4
7	6	5

(b) Explain non-monotonic reasoning in detail. **07**

Q.2 **(a)** Explain property inheritance algorithm with example. **07**

(b) Consider following facts. **07**

1. Every child loves Santa.
2. Every child loves every candy.
3. Anyone who loves some candy is not a nutrition fanatic.
4. Anyone who eats any pumpkin is a nutrition fanatic.
5. Anyone who buys any pumpkin either carves it or eats it.
6. John buys a pumpkin.
7. Lifesavers is a candy.

Use resolution and prove: If John is a child, then John carves some pumpkin.

OR

(b) Describe following facts into predicate logic. **07**

1. Every child loves Santa.
2. Everyone who loves Santa loves any reindeer.
3. Rudolph is a reindeer, and Rudolph has a red nose.
4. Anything which has a red nose is weird or is a clown.
5. No reindeer is a clown.
6. Scrooge does not love anything which is weird.

Q.3 **(a)** Explain difference between forwards reasoning and backward reasoning. **07**

(b) What do you understand by the term Fuzzy Logic? How is a fuzzy set denoted mathematically? **07**

OR

Q.3 **(a)** Define Frames. Draw Semantic Net for following statements. **07**

a) Every kid likes candy.

b) Every school going kid likes candy.

(b) Explain Bayesian Network in detail. **07**

Q.4 **(a)** Define Scripts. Write conceptual dependency for following statements. **07**

a) John flew to New York.

b) John shot Mary.

c) John ate eggs.

(b) Explain syntax and semantic analysis of natural language processing in detail. **07**

OR

Q.4 **(a)** Explain connectionist models. What is perceptron? What is concept of back propagation for ANNs? **07**

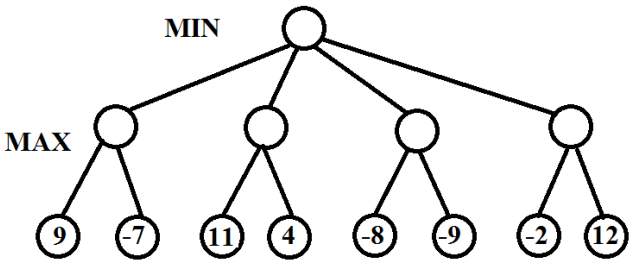
(b) What is state space representation of a problem? Show the state space of the water jug problem. **07**

Q.5 **(a)** Write following prolog programs: **07**

i. To find the sum of first n natural numbers.

ii. To append List2 to List1 and bind the result to List3.

(b) We have two players: MIN who plays first and can make 4 moves, MAX who plays second and can make 2 moves. Suppose that after 1 turn, the values of the leaves are as in the figure : **07**



Compute (with the algorithm minimax) the value of the root of the tree, than say which is the most convenient move for MIN. Then tell with the reason, which parts of the tree are not generated if we perform an alpha-beta pruning.

OR

Q.5 **(a)** Write following prolog programs: **07**

i. To find the factorial of a positive integer number.

ii. To find the n^{th} element of a given list.

(b) Discuss hill climbing search method. Also discuss limitations and ways to overcome these limitations. **07**

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Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2018

Subject Code: 2180703 **Date: 04/05/2018**

Subject Name: Artificial Intelligence

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	What is state space of a problem?	**03**
	(b)	Describe Breadth First Search. Comment on the optimalality of this method.	**04**
	(c)	In the Missionaries and Cannibals Problem, three missionaries and three cannibals must cross a river using a boat which can carry at most two people, under the constraint that, Number of cannibals should be lesser than the missionaries on either side. The boat cannot cross the river by itself with no people on board. For the above mentioned problem, describe state space representation, actions, start and end state.	**07**
Q.2	**(a)**	Describe heuristic function for the Travelling Salesman Problem.	**03**
	(b)	Discuss Turing Test.	**04**
	(c)	Discuss and Analyze Tower of Hanoi problem with respect to the seven problem characteristics.	**07**
		OR	
	(c)	Discuss Simulated Annealing search method. Compare it with hill climbing method.	**07**
Q.3	**(a)**	Discuss cut in prolog.	**03**
	(b)	Differentiate with example representation of “Instance” and “Isa” relationships.	**04**
	(c)	Explain with example how choosing the granularity of representation and finding the right structure are crucial issues in knowledge representation?	**07**
		OR	
Q.3	**(a)**	Discuss with example: Constraint Satisfaction Problem.	**03**
	(b)	Write a PROLOG program to find GCD of two numbers.	**04**
	(c)	Consider the following sentences: • Tennis is a game. Chess is a game. • John and Steve are students. • John plays Tennis. • Steve plays everything that John plays. • Students who play Tennis, do not play Chess. i. Translate the above sentences into formulas in Predicate logic ii. Prove using resolution that “Steve does not play Chess”	**07**
Q.4	**(a)**	Differentiate Fuzzy logic and Crisp logic.	**03**
	(b)	Explain Hopfield Network.	**04**
	(c)	Discuss Nonlinear Planning using Constraint Posting with example.	**07**

OR

Q.4 **(a)** Discus non-monotonic reasoning. **03**

(b) Discuss various defuzzification methods. **04**

(c) Explain following terms in reference to predicate logic Resolution. **07**

a. Unsuccessful attempt at resolution
b. Equality
c. Reduce
d. Trying several substitute

Q.5 **(a)** What is meant by Perceptron? Give one example. **03**

(b) Discuss Bayesian network and its application. **04**

(c) Write a PROLOG program Checking for Password. **07**

1. Give an opportunity to user to re-enter the password 'n' no. of times, on entering wrong password using Repeat predicate.
2. Give an opportunity to user to re-enter the password three (03) times, on entering wrong password.

OR

Q.5 **(a)** Consider the game tree given in Fig. 1, in which the evaluation function values are shown below each leaf node for the max player. Assume that the root node corresponds to the minimizing player. Assume that the search always visits children left-to-right. **03**

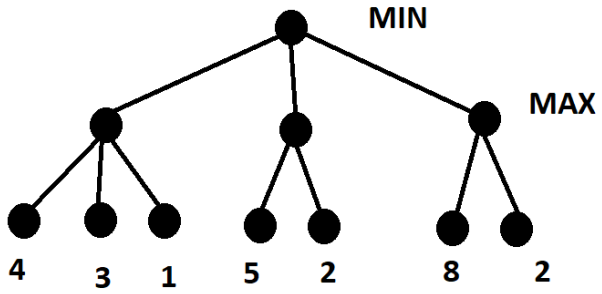

Fig : 1

Compute the backed-up values computed by the minimax algorithm by writing values at the appropriate nodes in the tree given.

(b) For the game tree given in Fig. 1, which nodes will not be examined by the alpha-beta pruning algorithm? Show the process of alpha-beta pruning to justify your answer. **04**

(c) Explain various steps of Natural Language Processing. **07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2180703 **Date: 02/11/2017**

Subject Name: Artificial Intelligence

Time:02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Describe different heuristics for the Blocks world problem.	**03**
	(b)	Discuss Cut and Fail in Prolog.	**04**
	(c)	Discuss with examples: AI Problem Characteristic.	**07**
Q.2	**(a)**	Discuss : Turing Test.	**03**
	(b)	Explain Best First Search method.	**04**
	(c)	What is wrong with the following arguments? • Men are widely distributed over the earth • Socrates is a man. • Therefore, Socrates is widely distributed over the earth. How should the facts represented by these sentences be represented in logic so that this problem does not arise?	**07**
		OR	
	(c)	Consider the following sentences: • Raj likes all kinds of food. • Apples are food. • Anything anyone eats and isn't killed by is food. • Sachin eats peanuts and is still alive. • Vinod eats everything Sachin eats. Now, attempt following: i. Translate these sentences into formulas in predicate logic ii. Use resolution to answer the question, "What food does Vinod eat?"	**07**
Q.3	**(a)**	Discuss limitations of Hill climbing search method.	**03**
	(b)	Explain non monotonic reasoning.	**04**
	(c)	Explain difference between forwards reasoning and backward reasoning.	**07**
		OR	
Q.3	**(a)**	Discuss steepest ascent hill climbing.	**03**
	(b)	Discuss various issues in design of search program.	**04**
	(c)	Define Frames. Draw Semantic Net for following statements. a) Every kid likes candy. b) Every school going kid likes candy.	**07**
Q.4	**(a)**	Discuss Bay's theorem.	**03**
	(b)	Discuss Simulated Annealing method of search.	**04**
	(c)	Explain alpha-beta cut off search with an example. State a case when to do alpha pruning.	**07**
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OR

Q.5	**(a)**	Discuss algorithm for perceptron learning.	**03**
	(b)	Write a prolog program to find the sum of first N natural numbers.	**04**
	(c)	Discuss Iterative Deepening Search. Also give one example to explain.	**07**

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