GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:3161608   **Date:02/12/2021**
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.**
   4. **Simple and non-programmable scientific calculators are allowed.**

|			MARKS
Q.1	**(a)**	What is Artificial Intelligence? List task of AI.	**03**
	(b)	Describe heuristic function for 8 puzzle problem.	**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 boat. For the above mentioned problem, describe state space representation, actions, start and end state.	**07**
Q.2	**(a)**	Define knowledge base agent in AI.	**03**
	(b)	Compare Breath first search and Depth first search method.	**04**
	(c)	Discuss Steepest-Ascent Hill climbing algorithm and also state its limitations.	**07**
		OR	
	(c)	Discuss Best –First search method with example.	**07**
Q.3	**(a)**	Define Soundness and completeness in propositional logic.	**03**
	(b)	From a standard deck of playing cards, a single card is drawn. The probability that the card is king is 4/52, then calculate posterior probability P(King|Face), which means the drawn face card is a king card.	**04**
	(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. Attempt following: i. Translate these sentences into formulas in predicate logic ii. Use resolution to answer the question, "What food does Vinod eat?"	**07**
		OR	
Q.3	**(a)**	Show by means of a truth table that $\neg(P \wedge Q) \equiv (\neg P \vee \neg Q)$	**03**
	(b)	Write inference using Full Joint Distributions with example.	**04**
	(c)	Explain forward and backward reasoning with example.	**07**
Q.4	**(a)**	State the purpose of unification in predicate logic.	**03**
	(b)	Discuss Bay's theorem.	**04**
	(c)	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**
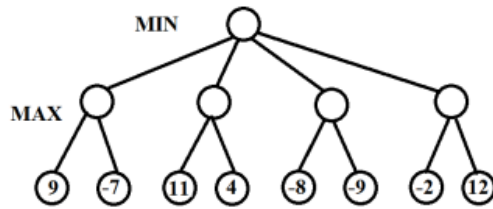
Compute (with the algorithm mini max) the value of the root of the tree, than say which is the most convenient move for MIN. Then tell with the reason, which parts of the tree are not generated if we perform an alpha-beta pruning.

OR

Q.4	**(a)**	Convert following compound proposition to the CNF (Conjunctive Normal Form). $\neg (A \rightarrow B) \vee (C \rightarrow A)$	**03**
	(b)	Discuss Bayesian network and its application.	**04**
	(c)	Discuss Iterative Deepening search.	**07**

Q.5	**(a)**	List and state input predicates in turbo prolog	**03**
	(b)	What are the methods of statistical learning?	**04**
	(c)	Write a prolog program	**07**
		i. Find the sum of first N natural numbers	
		ii. Find the length of the given list.	

OR

Q.5	**(a)**	Discuss recursion in prolog.	**03**
	(b)	Explain EM Algorithm with example.	**04**
	(c)	Write following prolog programs:	**07**
		i. To find the factorial of a positive integer number.	
		ii. To find the nth element of a given list.	

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