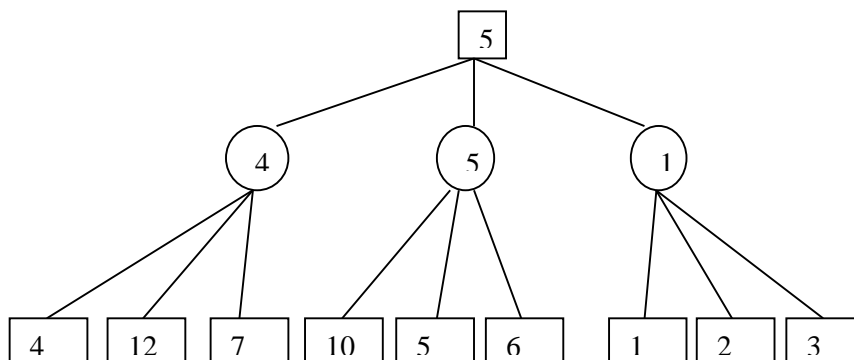


GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (NEW) EXAMINATION – SUMMER 2021****Subject Code:2180703****Date:05/08/2021****Subject Name:Artificial Intelligence****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

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

MARKS

- Q.1**
- (a) Define Artificial Intelligence. List the task domains of AI problems. **03**
- (b) What is a heuristic function? Describe two different heuristic functions for the blocks world problem and show how heuristic function plays an important role in search space exploration. **04**
- (c) Discuss the seven problem characteristics with respect to the travelling salesman problem. **07**
- Q.2**
- (a) What is a state space search? Explain with respect to the water jug problem. **03**
- (b) Explain admissibility of A* algorithm. **04**
- (c) Discuss hill climbing and its variations. Apply any one to the blocks world problem. **07**
- OR**
- (c) Solve the following cryptarithmic problem using constraint satisfaction.
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 =APPLE **07**
- Q.3**
- (a) Name and explain Quantifiers in Predicate logic. **03**
- (b) Design a good heuristic function for the tic-tac-toe game. Illustrate. **04**
- (c) What is alpha –beta cutoff? Apply and explain the same for the following example. **07**

**OR**

- Q.3** (a) Explain forward reasoning and backward reasoning. **03**

	(b)	Compare breadth first search and depth first search for Completeness, Complexity and Optimality.	04
	(c)	Represent the following statements in predicate logic.	07
Q.4	(a)	What is a Horn Clause? Give examples.	03
	(b)	Give steps for resolution refutation for proving an arbitrary well formed formula (wff) w from a set of wffs Δ .	04
	(c)	Explain the minimax algorithm with an example.	07
OR			
Q.4	(a)	Discuss the limitations of hill climbing search technique.	03
	(b)	Convert the following propositional calculus wff into clauses: $\neg [((P \vee \neg Q) \rightarrow R) \rightarrow (P \wedge R)]$	04
	(c)	Explain the following modifications to the minimax procedure. 1) Waiting for Quiescence 2) Secondary Search 3) Book moves	07
Q.5	(a)	Express the following statement in the predicate calculus. “All of the packages in room 27 are smaller than any of the packages in room 28”.	03
	(b)	Convert the following to clause form. $((\exists x)[P(x)] \vee (\exists x)[Q(x)]) \rightarrow (\exists x)[P(x) \vee Q(x)]$	04
	(c)	How is Fuzzy logic different than Crisp logic? What is the importance of the membership function? Explain the Union, Intersection and Complement Fuzzy set operations with an example.	07
OR			
Q.5	(a)	List the applications of artificial neural network.	03
	(b)	What is understanding? What makes understanding hard?	04
	(c)	Explain the various components of the Natural Language Understanding process.	07
