GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VI EXAMINATION – WINTER 2025

Subject Code:3161608   **Date:21-11-2025**
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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is Intelligence? Define Artificial Intelligence. Discuss any one area where artificial intelligence can do better than human intelligence.	**03**
	(b)	Give an example of a problem for which breadth-first search would work better than depth-first search.	**04**
	(c)	Describe how the branch-and-bound technique could be used to find the shortest solution to a water jug problem.	**07**
Q.2	**(a)**	Discuss Bayesian network and its two applications.	**03**
	(b)	Consider the following sentences:	**04**

    1. Rama likes all kinds of vegetarian food.
    2. Oranges are food.
    3. Mutton is food.
    4. Anything anyone eats and is not killed by is food.
    5. Likex eats peanuts and is still alive.
    6. Lovex eats everything Likex eats.
Translate these sentences into formulas in Predicate Logic.

(c) 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. **07**

Initial state

	1	2
3	4	5
6	7	8

Goal state

1	2	3
8		4
7	6	5

OR

(c) Solve the following Crypt Arithmetic problem. **07**

    DONALD
  + GERALD
  ─────────
    ROBERT

Q.3	**(a)**	Convert the logical statement $P \Leftrightarrow (Q \lor R)$ to conjunctive normal form.	**03**
	(b)	What is Hill Climbing algorithm? Discuss any two cases where Hill climbing fails.	**04**
	(c)	Explain the AO* algorithm with an example.	**07**

OR

Q.3	**(a)**	Differentiate propositional logic and predicate logic.	**03**
	(b)	Give four examples of facts that are difficult to represent and manipulate in predicate logic.	**04**
	(c)	Discuss Best –First search method with example.	**07**

Q.4 **(a)** Define Soundness and completeness in propositional logic. **03**

(b) Explain goal stack planning in brief. **04**

(c) Explain alpha-beta pruning in Minimax procedure for game playing with example. **07**

OR

Q.4 **(a)** State the purpose of unification in predicate logic. **03**

(b) A problem-solving search can proceed either forward or backward. What factors determine the choice of direction for a particular problem. **04**

(c) Explain Minimax procedure for game playing with any example. **07**

Q.5 **(a)** Compare monotonic and non-monotonic reasoning. **03**

(b) Consider the sentence: The old man's glasses were filled with sherry. What information is necessary to choose the correct meaning for the word "glasses"? What information suggests the incorrect meaning? **04**

(c) Write a Prolog program to merge two sequentially ordered (ascending) lists into one ordered list. **07**

OR

Q.5 **(a)** What are the methods of statistical learning? **03**

(b) Explain the steps of natural language processing in brief. **04**

(c) Write a prolog program to find sum of all the numbers of a list. **07**

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