Enrolment No./Seat No_____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE- SEMESTER–VII EXAMINATION – WINTER 2025**

**Subject Code:3170716 Date:26-11-2025**

**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)** | Give classification of Artificial Intelligence. | **03** |
| | **(b)** | Discuss the requirement of good control strategy in AI. | **04** |
| | **(c)** | Illustrate the AI problem characteristics in detail with example. | **07** |
| **Q.2** | **(a)** | Differentiate Hill Climbing and Best First Search algorithm. | **03** |
| | **(b)** | 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. | **04** |
| | **(c)** | Apply the A* algorithm to optimize the route for a delivery truck that needs to visit multiple locations. Assume a map with at least four nodes (locations) and distances between them, along with specified start and goal locations. Demonstrate how A* finds the most efficient route. Explain the use of the cost function and heuristic in this context. | **07** |
| | | **OR** | |
| | **(c)** | Discuss Best First Search algorithm with the example of 8-puzzle problem. | **07** |
| **Q.3** | **(a)** | Differentiate procedural and declarative knowledge. | **03** |
| | **(b)** | Discuss the different approaches to knowledge representation. | **04** |
| | **(c)** | Solve following cryptarithmetic puzzle.<br>BEST + MADE = MASER | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Perform the unification of following atomic sentences. (i.e. Find the most general unifier)<br>1. Find(Raj, x); Find(y, Mohan(y))<br>2. T(f(x), g(y), h(z)) ; T(f(a), g(b), h(c)) | **03** |
| | **(b)** | Explain Hopfield Network with example. | **04** |

**(c)** Translate following sentences to predicate logic and prove "West is criminal" using resolution. **07**

1. It is a crime for an American to sell weapons to hostile nations.
2. All the missiles were sold to Nono by West.
3. The country Nono is an enemy of America.
4. An enemy of America counts as hostile.
5. Nono has some missiles.
6. Missiles are weapons. **7.** West is an American.

**Q.4** **(a)** Explain the significance of crossover in Genetic Algorithms. **03**

**(b)** Explain non monotonic reasoning. **04**

**(c)** What are the applications of Bayesian Networks? Explain it with suitable example. **07**

**OR**

**Q.4** **(a)** Differentiate propositional logic and predicate logic. **03**

**(b)** Assume the following facts. **04**

1. Steve only likes easy courses.
2. Science courses are hard.
3. All the courses in the basket weaving department are easy.
4. BK301 is a basket weaving course.

Translate above statements to predicate logic and use forward chaining to answer the question, "What course would Steve like"

**(c)** Illustrate min-max algorithm with alpha beta cut off by taking suitable example. **07**

**Q.5** **(a)** What is semantic analysis in NLP, and how is it different from syntactic processing? **03**

**(b)** Write a prolog program to find a factorial of a given number. **04**

**(c)** Demonstrate the use of Cut and Fail predicates in Prolog with example. **07**

**OR**

**Q.5** **(a)** Explain Hierarchical Planning. **03**

**(b)** Explain syntax and morphological analysis phases of NLP. **04**

**(c)** Write following Prolog programs: **07**

1. To display all elements of a list.
2. To append one list to another list.

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