Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3170716 Date:03/06/2022

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.**

Q.1	**(a)**	Define AI. What are the task domains of AI?	**03**
	(b)	Explain Water Jug problem with Sate Space Search method.	**04**
	(c)	Explain Best First Search with suitable example.	**07**
Q.2	**(a)**	Define the following. 1. Modus Ponens 2. Horn Clause 3. Existential Quantifier	**03**
	(b)	Explain Semantic Net with example.	**04**
	(c)	Consider the following sentences: • Rita likes all kinds of food. • Apples are food. • Anything anyone eats and isn't killed by is food. • Rahi eats peanuts and is still alive. • Tanvi eats everything Rahi eats. i. Translate these sentences into formulas in predicate logic. ii. Use resolution to answer the question, "What food does Tanvi eat?"	**07**
		OR	
	(c)	Explain Forward Reasoning and Backward Reasoning with example.	**07**
Q.3	**(a)**	Explain Expert System Shell with example.	**03**
	(b)	Explain MiniMax search procedure.	**04**
	(c)	Explain Artificial Neural Network.	**07**
		OR	
Q.3	**(a)**	Draw and explain architecture of Expert System.	**03**
	(b)	Show the use of Alpha-Beta pruning.	**04**
	(c)	Explain Backpropagation algorithm in Neural Network.	**07**
Q.4	**(a)**	Briefly explain any one application of Natural Language Processing.	**03**
	(b)	A bag I contains 4 white and 6 black balls while another Bag II contains 4 white and 3 black balls. One ball is drawn at random from one of the bags, and it is found to be black. Find the probability that it was drawn from Bag I.	**04**
	(c)	Explain Roulette-Wheel selection method of genetic algorithm.	**07**
		OR	
Q.4	**(a)**	Enlist and describe different phases involved in Natural Language Processing.	**03**
	(b)	The task is to recognize English alphabetical characters *(F, E, X, Y, I, T)* in an image processing system. Define two fuzzy sets $\tilde{I}$ and $\tilde{F}$ to represent the identification of characters I and F. $\tilde{I}$*={(F, 0.4), (E, 0.3), (X, 0.1), (Y, 0.1), (I, 0.9), (T, 0.8)}* $\tilde{F}$*={(F, 0.99), (E, 0.8), (X, 0.1), (Y, 0.2), (I, 0.5), (T, 0.5)}*	**04**

Find the following.

1. $\tilde{I} \cup \tilde{F}$
2. $\tilde{I} - \tilde{F}$

(c) Describe the phases of genetic algorithm. **07**

Q.5 **(a)** Explain planning problem. **03**

(b) Explain limitations of Hill Climbing algorithm. **04**

(c) Explain Cut and Fail predicates in Prolog. **07**

OR

Q.5 **(a)** Explain how planning is different from search procedure? **03**

(b) Compare DFS and BFS. **04**

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

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