

ADMISSION NUMBER									

School of Computing Science and Engineering

Bachelor of Science in Computer Science
Semester End Examination - May 2024

Duration : 180 Minutes
Max Marks : 100

Sem VI - E1UP604B - Soft Computing

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) List the stopping condition for Genetic algorithm flow. K1 (2)
- 2) Summarize the different methods of defuzzification. K2 (4)
- 3) How identifying rule-based structures contributes to the efficiency of adaptive networks. K2 (6)
- 4) Consider two given fuzzy sets K3 (9)
 $A = \{0.3/2, 0.5/4, 0.21/6, 0/8\}$

And Fuzzy Set B:
 $B = \{0.5/2, 0.4/4, 0.1/6, 0/8\}$

Perform the specified operations: union, intersection, difference and complement over fuzzy sets A and B.

- 5) Consider two fuzzy sets $A = \{(x1, 0.5) (x2, 0.7) (x3, 0)\}$ and $B = \{(x1, 0.8) (x2, 0.2) (x3, 1)\}$. Perform the following operations: 1) Union 2) Intersection 3) Difference 4) Complement over fuzzy sets A and B. K3 (9)
- 6) Evaluate the output of a neuron in the hidden layer of an MLP with inputs (0.5, 0.3), weights (0.2, 0.4), and a sigmoid activation function. K5 (10)
- 7) In a Genetic Algorithm (GA) using the roulette wheel selection method, consider a population of four individuals with the following fitness values: K4 (12)

Individual 1: Fitness = 20
 Individual 2: Fitness = 15
 Individual 3: Fitness = 30
 Individual 4: Fitness = 25

Calculate the selection probability for each individual and perform the roulette wheel selection to choose two parents for crossover.

- 8) Consider a TSP with 4 cities (A, B, C, D), and the distances between them are as follows: K5 (15)

Distance between A and B: 10 units

Distance between A and C: 15 units

Distance between A and D: 20 units

Distance between B and C: 25 units

Distance between B and D: 30 units

Distance between C and D: 35 units

Find the shortest possible route that visits each city exactly once and returns to the starting city.

- 9) Elaborate the two requirements to solve a problem by a GA with examples. K5 (15)

- 10) Design and provide a comprehensive plan for implementing fuzzy sets and membership functions to represent and control water quality in a fish tank using a fuzzy logic controller. K6 (18)