Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EC360

Course Name: SOFT COMPUTING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

1 a) Distinguish between hard and soft computing. (5)

b) With suitable diagram distinguish between Type-1 fuzzy logic and Type-2 Fuzzy logic. (6)

c) Consider two fuzzy sets $\tilde{X} = \{3,2,8,6\}$ and $\tilde{Y} = \{2,1,4,9\}$. Find the relation set R such that $R = \{(x,y) \mid y = x + 3\}$. (4)

2 a) What are Fuzzy Relations? Draw and explain the bipartite and direct graph of fuzzy relation. (5)

b) Consider membership function of two fuzzy sets $\tilde{A}$ and $\tilde{B}$ are given by $\mu_A(x) = \frac{x}{x+2}$ and $\mu_B(x) = 3^{-x}$. Find the membership function of i) $\tilde{A}^C$ ii) $\tilde{B}^C$, iii) $\tilde{A} \cup \tilde{B}$, iv) $\tilde{A} \cap \tilde{B}$, v) $(\tilde{A} \cup \tilde{B})^C$, where ^{C} is complement. (10)

3 a) With an example describe alpha-cut and strong alpha-cut. (5)

b) Consider fuzzy sets M = {0.9/low + 0.3/average +0.5/high} , N = { 1/small + 0.2/medium + 0.4/big}, & T ={0.4/low + 0.1/average + 0.7/high} , Find the fuzzy relation for Cartesian product $R = M \times N$ and max-min composition for $T \circ R$. (10)

PART B

Answer any two full questions, each carries 15 marks.

4 a) What are Linguistic variables and Hedges? (4)

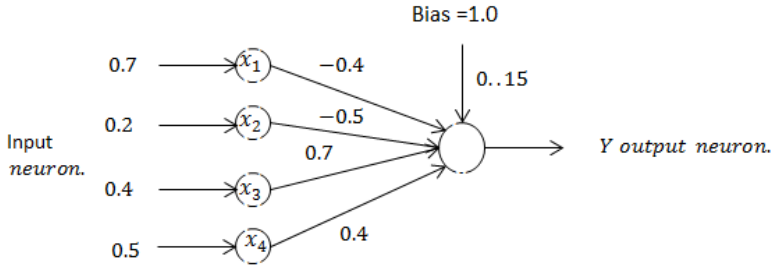
b) Consider the fuzzy relation R defined in A x A. Check whether the fuzzy relation is i) Reflexive, ii) Symmetric and iii) Transitive. (6)

$$R = \begin{bmatrix} 0.4 & 0.1 & 0.7 \\ 0.1 & 0.2 & 0.2 \\ 0.4 & 0.5 & 0.3 \end{bmatrix}$$

c) Compare between biological neural network and artificial neural network. (5)

5 a) Define defuzzification. Illustrate various types of defuzzification techniques. (7)

b) Apply the binary and bipolar sigmoidal function for figure and find its output. (8)



6 a) Describe the concept of McCulloch-Pitts neuron? Considering binary input data implement AND function using McCulloch-Pitts neuron. (8)

b) With the help of a block diagram, explain a fuzzy rule based system. (7)

PART C

Answer any two full questions, each carries 20 marks.

7 a) With a suitable architecture, explain the various steps in back propagation learning algorithm. (10)

b) Briefly describe the various cross over techniques employed in genetic algorithm. (10)

8 a) Implement the AND logic function using Perceptron network algorithm for bipolar inputs and targets. (10)

b) Explain different types of survivor selection method used in genetic algorithms. (10)

9 a) Apply genetic algorithm to optimize the problem on 'maximizing the function $f(x) = 5(x) + 10$'. Select x that varies between 0 and 25. (10)

b) What is meant by linear separability? Draw and explain the linear separability for AND, OR, and XOR functions. (10)

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