

Name :
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
07 THRISSUR CLUSTER

SECOND SEMESTER M.TECH. DEGREE EXAMINATION APR 2018
Computer Science and Engineering
Computer Science and Engineering
07CS6120 SOFT COMPUTING

Time : 3 hours

Max.Marks: 60

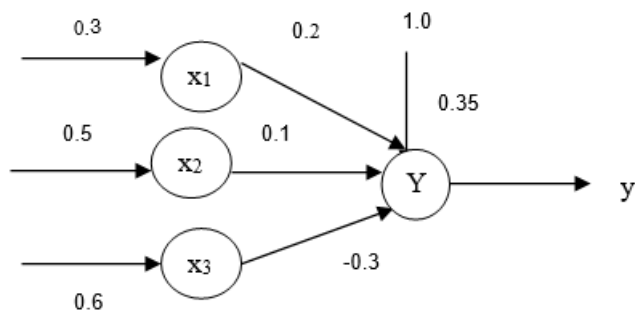
Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1a	Analyse the constituents of soft computing and the applications of each methodology.	4

Answer b or c

b	Calculate the output of the neuron y for the following network using	5
	1. binary sigmoidal activation function	
	2. bipolar sigmoidal activation function	



C	Describe the different supervised learning methods with architectures	5
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Q.no	Module 2	
2a	Describe architectures and learning methods of radial basis function networks	4

Answer b or c

b.	Elaborate the method of Kohonen Self-Organising Networks are used for problem solving	5
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c. Describe PCA based unsupervised learning methods. 5

Q.no. Module 3

3a. What is the necessity of composition of relation & explain the various types of Composition techniques on fuzzy relations. 4

Answer b or c

b. The fuzzy Cartesian product performed over fuzzy sets A and B results in fuzzy 5

Relation R given by $R = A \times B$. Hence;

$$R = \begin{bmatrix} 0.3 & 0.3 \\ 0.4 & 0.7 \\ 0.4 & 0.9 \end{bmatrix} \quad \min = (x, y)$$

Two fuzzy relation are given by

$$R = \begin{matrix} & \begin{matrix} Y1 & Y2 \end{matrix} \\ \begin{matrix} X1 \\ X2 \end{matrix} & \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \end{matrix} \quad \text{and}$$

$$S = \begin{matrix} & \begin{matrix} Z1 & Z2 & Z3 \end{matrix} \\ \begin{matrix} Y1 \\ Y2 \end{matrix} & \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix} \end{matrix}$$

Obtain the relation T as a composition between the fuzzy relations.

c. Fuzzy binary relation R is defined on set $A = \{1, 2, 3, \dots, 100\}$ and $B = \{50, 51, \dots, 100\}$ and represents the relation "a is much smaller than b". It is denoted by the membership function

$$\begin{cases} R(a, b) = 1 - \frac{a}{b} & \text{for } a \leq b \\ 0 & \text{Otherwise} \end{cases}$$

Where $a \in A$ and $b \in B$. Find the domain and range of R

Consider 2 fuzzy sets A and B. $A = \{(x1, 0.3)(x2, 0.4)(x3, 0.6)\}$, $B = \{(x1, 0.2)(x2, 0.6)(x3, 0.5)\}$. Find Complement, Union, Intersection, and Difference.

Q.no. Module 4

4a. With suitable block diagram, explain working principle of Fuzzy Inference System?

List the methods of Fuzzy Inference System

4

Answer b or c

- b** Consider a two input – one output problem that includes following three rules. **5**

Rule: 1 - IF x is A3 OR y is B1 THEN z is C1

Rule: 2 - IF x is A2 AND y is B2 THEN z is C2

Rule: 3 - IF x is A1 THEN z is C3

Assume $A3=0.1$, $B1=0.2$, $A2=0.3$, $B2=0.8$, $A1=0.5$ and the selected values of z in $C1=(0,10,20)$, $C2=(30,40,50,60)$ & $C3=(70,80,90,100)$. Find out the value of z using Mamdani fuzzy inference system.

- c** Elaborate the problem solving using Sugeno fuzzy model **5**

Q.no.

Module 5

- 5a.** Write short note on meta heuristic framework for Ant Colony Optimisation. **5**

Answer b or c

- b** How Ant Colony Optimization used to solve Generalized assignment Problem **7**
- c** How Ant Colony Optimization used to solve multiple Knapsack Problem. **7**

Q.no.

Module 6

- 6a.** What are genetic algorithms? What are the operators in Genetic Algorithm? **5**

Answer b or c

- b** A salesman has to follow the shortest route to visit N cities exactly once and reach the starting city. Apply genetic algorithm to solve this problem **7**
- c** Design the solution of any machine learning problem using Genetic Algorithm **7**