

Total No. of Questions : 8]

SEAT No. :

P3611

[Total No. of Pages : 3

[4959] - 1097
B.E. (E & TC) (Semester- II)
SOFT COMPUTING TECHNIQUES
(2012 Course) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) Answers any four questions out of Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks*
- 4) Assume Suitable data if necessary*

- Q1)** a) Draw and explain nonlinear model of neuron. [6]
b) Explain the architecture and training algorithm of learning vector quantization(LVQ). [6]
c) Describe various operations that can be performed for fuzzy sets. [8]

OR

- Q2)** a) Discuss linear separability concept. Explain gradient descent algorithm. [6]
b) Explain cover's theorem. Describe the mapping function like Gaussian and multiquadratic. [6]
c) Explain the concept of composite linguistic variables and the use of concentration and dilation operations [8]

- Q3)** a) Explain block diagram of fuzzy inference system (FIS) in detail. [6]
b) Describe in detail the following process of defuzzification: [6]
i) Centroid method
ii) Weighted average method
c) Implement a simple two input single output FIS employing Mamdani model. [6]

OR

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- Q4)** a) Discuss in detail the process of fuzzification. What are the various methods of fuzzification? [6]
- b) Explain Sugeno fuzzy model of FIS with example. [6]
- c) Given a rule : If x is A, THEN y is B, where $A = \left\{ \frac{0.3}{1}, \frac{0.7}{2}, \frac{0.8}{3} \right\}$ and $B = \left\{ \frac{0.8}{5}, \frac{0.6}{7}, \frac{0.3}{9} \right\}$ Infer B' for another rule : IF x is A' THEN y is B' where A' is $\left\{ \frac{0.2}{1}, \frac{0.9}{2}, \frac{0.4}{3} \right\}$ using Mamdani implication rule and max - min composition. [6]
- Q5)** a) Explain in detail the architecture of fuzzy logic controller. [8]
- b) What are the steps involved in designing fuzzy logic controller. State the applications of FLC. [8]

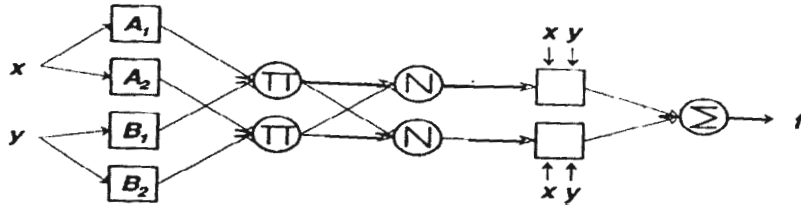
OR

- Q6)** a) Compare fuzzy logic controller with traditional PID controller. Discuss the assumptions in fuzzy control system design. [8]
- b) Discuss the application of FLC in air craft landing control problem in detail. [8]
- Q7)** a) Explain in detail ANFIS with architecture. [8]
- b) Discuss in detail two pass learning in ANFIS. [8]

OR

- Q8)** a) Explain hybrid learning algorithm employed in ANFIS. [6]

- b) Compute output f for ANFIS network shown in fig. Assume A_1, A_2, B_1, B_2 as gbell membership function. [10]



Given : $x = 20, y = 25$

| Premise parameters | | | |
|-----------------------|-------------|-------------|-------------|
| A_1 | $a = 40$ | $b = 2$ | $c = 0$ |
| A_2 | $a = 40$ | $b = 2$ | $c = 70$ |
| B_1 | $a = 40$ | $b = 2$ | $c = 0$ |
| B_2 | $a = 40$ | $b = 2$ | $c = 70$ |
| Consequent Parameters | | | |
| f_1 | $p_1 = 0.6$ | $q_1 = 0.9$ | $r_1 = 0.3$ |
| f_2 | $p_2 = 0.5$ | $q_2 = 0.4$ | $r_2 = 0.2$ |

