

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

**P.T.O.**

**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]

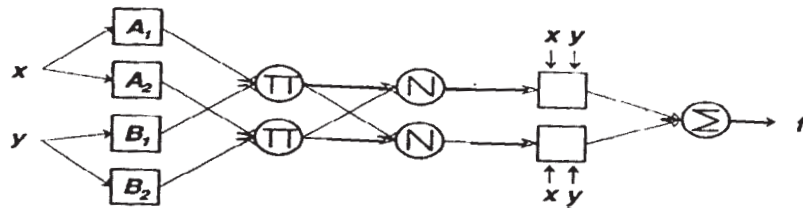
**Q7)** a) Explain in detail ANFIS with architecture. [8]

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			
$f_1$	$p_1 = 0.6$	$q_1 = 0.9$	$r_1 = 0.3$
$f_2$	$p_2 = 0.5$	$q_2 = 0.4$	$r_2 = 0.2$

