Total No. of Questions : 8]

SEAT No. : ____

P3628

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[4959]-1117
B.E.(Electronics)
SOFT COMPUTING
(2012 Pattern)(End Sem) (Semester-II)(404211D)(Elective-III)

Time :2½Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Answer Q 1 or Q 2, Q 3 or Q4,Q5 or Q6,Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State the perceptron learning rule. Also explain its limitation and solution for the same. **[8]**

b) Explain the architecture of Radial Basis Function network and explain the learning mechanism. How are the clusters determined? **[6]**

c) Define the terms for a fuzzy set: **[6]**

i) Normality

ii) Convexity

iii) Symmetry

Q2) a) State and explain the popular topologies of neural networks. **[8]**

b) Explain backpropagation algorithm for MLP with a neat signal flow graph. **[6]**

c) Consider two fuzzy sets A and B compute Union, Intersection, Difference for these sets. **[6]**

$$A = \left\{ \frac{0.8}{2}, \frac{0.4}{3}, \frac{0.6}{4}, \frac{0.1}{5}, \frac{0.3}{6} \right\}$$

$$B = \left\{ \frac{0.3}{2}, \frac{0.8}{3}, \frac{0.6}{4}, \frac{0.8}{5}, \frac{0.2}{6} \right\}$$

P.T.O.

Q3) a) Explain the terms: **[8]**

i) Premise(Antecedent)

ii) Consequence(consequence)

iii) FAM

iv) Rule-Base

b) Enlist the implication rules used in FIS and explain them in brief. **[8]**

Q4) a) Consider fuzzy relations: **[8]**

$$R = \begin{matrix} \\ x_1 \\ x_2 \end{matrix} \begin{matrix} \begin{matrix} y_1 & y_2 \end{matrix} \\ \begin{bmatrix} 0.7 & 0.6 \\ 0.8 & 0.3 \end{bmatrix} \end{matrix}, S = \begin{matrix} \\ y_1 \\ y_2 \end{matrix} \begin{matrix} \begin{matrix} z_1 & z_2 & z_3 \end{matrix} \\ \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix} \end{matrix}$$

Find the relation T= R ∘ S using max-min and max-product composition.

b) Explain the Tsukamoto fuzzy model used in FIS with a suitable example. **[8]**

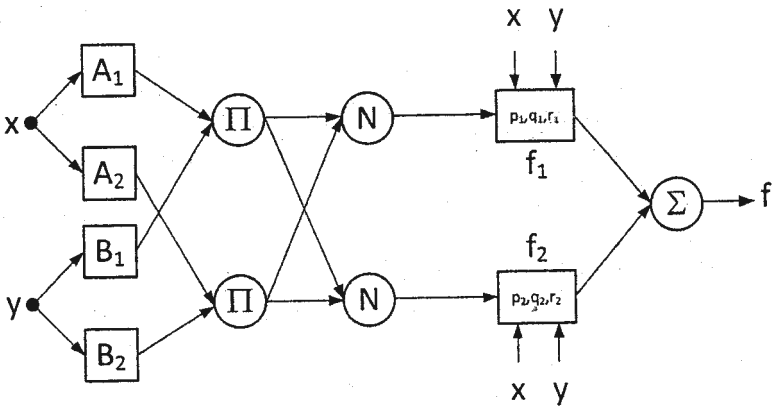
Q5) a) What are the advantages of FLC over conventional PID controller? **[8]**

b) Enlist the steps in designing a simple fuzzy control system. **[8]**

Q6) a) Describe the architecture of Mamdani type FLC with a suitable example. **[8]**

b) Enlist the applications where FLC may be preferred over that of conventional PID controller. **[8]**

Q7) a) Compute the output *f* for the ANFIS network shown in figure. Assume A_1, A_2, B_1, B_2 as gbell membership functions: **[10]**



Given: x = 25, y = 30

Premise parameters			
A_1	a = 50	b = 3	c = 0
A_2	a = 50	b = 3	c = 100
B_1	a = 50	b = 3	c = 0
B_2	a = 50	b = 3	c = 100
Consequent parameters			
f_1	$p_1 = 0.5$	$q_1 = 1$	$r_1 = 0.2$
f_2	$p_2 = 0.8$	$q_2 = 0.7$	$r_2 = 0.5$

b) Explain in details the Hybrid learning in ANFIS. **[8]**

Q8) a) Explain the Architecture of ANFIS. **[10]**

b) What are the advantages and limitations of ANFIS? **[8]**