SUBJECT CODE NO:- P-362
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (CSE) Examination MAY/JUNE-2016
Soft Computing
(Revised)

[Time: Three Hours]   [Max Marks:80]

"Please check whether you have got the right question paper."

N.B   i) Q.No.1 from section A and Q.No.6 from section B are compulsory.
               ii) Attempt any two questions from the remaining questions in each section.
   iv) Assume suitable data, if necessary.

Section A

Q.1   Answer the following (any two)   10
    a)   What is soft computing? Differentiate between soft computing & hard computing.
    b)   Explain various types of soft computing techniques and give its applications.
    c)   What is single layer FFNN? What is multilayer FFNN?

Q.2   a)   Realize the working of AND gate using MP neuron.   08
       b)   What are different types of learning rules? Explain any three basic learning laws.   07

Q.3   a)   What are linearly inseparable problems? How to solve X-OR problem.   08
       b)   Explain perceptron learning for pattern classification with example.   07

Q.4   a)   Train a hetero associative memory network using Hebb rule to store input row vector $s =(s_1, s_2, s_3, s_4)$ to the   08
             output row vector $t =(t_1, t_2)$. The Vector pairs are given in table.

Input Target	S_1	S_2	S_3	S_4	t_1	t_2
1	1	1	0	0	0	1
2	0	0	1	1	0	1

       b)   What is Hopfield network? Explain Hopfield network to store & recall a set of bipolar patterns.   07

Q.5   Write short notes on (any three)   15
    a)   Bidirectional associative memory.
    b)   Auto association & hetero association.
    c)   Limitations of back propagation learning algorithm.
    d)   Basic functional units of ANN.
    e)   Error correction and gradient decent rule.

Section B

Q.6   Answer the following (any two)   10
    a)   Differentiate between crisp set and fuzzy set with example.
    b)   Explain application of self-organizing feature map.
    c)   What are imprecise queries? Explain with example.

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Q.7 a) What is feature mapping network? What are the silent features of the kohonen's self-organizing feature map learning algorithm? 07

b) Consider a kohonen self-organizing net with two cluster units and four input units. The weight vectors for the cluster units are given by $w_1 = [0.2\ \ 0.4\ \ 0.6\ \ 0.8\ ]$, $w_2 = [\ 0.9\ \ 0.7\ \ 0.5\ \ 0.3]$ 08

use the square of the Euclidean distance to find the winning cluster unit for the input pattern $[\ 0\ \ 0\ \ 1\ \ 1\ ]$ using a learning rate of 0.5 find the new weights for the winning unit.

y_1 y_2
Y_1 0.8 Y_2 0.3
0.9
0.2   0.4   0.6   0.7   0.5

x_1 x_2 x_3 x_4

X_1 X_2 X_3 X_4
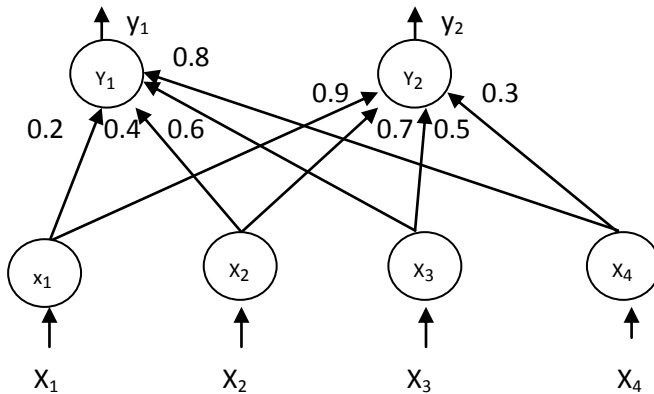
Q.8 a) Consider the given fuzzy sets $\underset{\sim}{D_1}$ and $\underset{\sim}{D_2}$ 08

$$\underset{\sim}{D_1} = \left\{\frac{0}{0} + \frac{0.2}{10} + \frac{0.35}{20} + \frac{0.65}{30} + \frac{0.85}{40} + \frac{1}{50}\right\}\ \underset{\sim}{D_2} = \left\{\frac{0}{0} + \frac{0.35}{10} + \frac{0.25}{20} + \frac{0.8}{30} + \frac{0.95}{40} + \frac{1}{50}\right\}$$

Find the following membership functions

a. $\underset{\sim}{D_1} \cup \underset{\sim}{D_2}$ b. $\underset{\sim}{D_1} \cap \underset{\sim}{D_2}$ c. $\overline{\underset{\sim}{D_1}}$

d. $\overline{\underset{\sim}{D_2}}$ e. $\underset{\sim}{D_1} / \underset{\sim}{D_2}$ f) $\underset{\sim}{D_2} \cup \overline{\underset{\sim}{D_1}}$

b) Two fuzzy relation are given by $\underset{\sim}{R} = \begin{array}{c}x_1 \\ x_2\end{array}\begin{bmatrix} y_1 & y_2 \\ 0.6 & 0.3 \\ 0.2 & 0.9\end{bmatrix}$ & $\underset{\sim}{S} = \begin{array}{c}y_1 \\ y_2\end{array}\begin{bmatrix} z_1 & z_2 & z_3 \\ 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7\end{bmatrix}$ 07

Find fuzzy relation $\underset{\sim}{T}$ using max. min. composition.

Q.9 a) What is the difference between similarity and possibility based approach of fuzzy databases? What are the advantages & disadvantages of these approaches? 08

b) Explain the different operations on fuzzy relational data models. 07

Q.10 Write short notes on (any three) 15
a) Fuzzy object oriented database
b) Genetic algorithm
c) Numerical Vs linguistic variables
d) Learning vector quantization
e) Properties of membership function