Exam Date & Time: 17-Jan-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JAN 2024

Principles of Soft computing [CSE 4305]

Marks: 50   **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)	Explain the following learning methods.	
A)	i)Memory based ii)Hebbian learning iii) Competitive and iv) Boltzman learning	(4)
B)	Describe the three types of learning in neural network.	(3)
C)	Describe the properties of Soft computing and list the applications.	(3)
2)	Explain the back-propagation neural network algorithm to find the weights of the network.	(4)
A)		
B)	Implement AND function using perceptron networks for bipolar inputs and targets.	(4)
C)	State the testing algorithm used in perceptron networks.	(2)

3) Construct a Kohonen self-organizing map to cluster the four given vectors [0 0 1 1] and [1 0 0 0]. The number of clusters formed is two. The learning rate is 0.5.

A) w_1=[0.2 0.4 0.6 0.8] w_2=[0.9 0.7 0.5 0.3]   (4)

B) Train a heteroassociative memory network using Hebb rule to store input vector s=(s_1, s_2, s_3, s_4) to the output vector t=(t_1, t_2). The vector pairs are given as below: (4)

s_1	s_2	s_3	s_4	t_1	t_2
1	0	1	0	1	0
1	0	0	1	1	0

1	1	0	0	0	1
0	0	1	1	0	1

C)   Explain the working of self-organizing feature map.

(2)

4)   Construct an auto associative network to store the vectors $x_1 = [1\ 1\ 1\ 1\ 1]$,

$X_2 = [1\ -1\ -1\ 1\ -1]$, $x3 = [-1\ 1\ -1-1-1]$. Find weight matrix with no self-connection.

A)   Calculate the energy of the stored patterns. Using discrete Hopfield network test patterns if   (4)
the rest pattern are given as x1[1 1 1 -1 1], x2=[1 -1 -1 -1 -1] and x3 =[1 1 -1 -1 -1].
Compare the test patters energy with the stored patterns energy.

B)   Write the testing algorithm for discrete bidirectional associative memory (BAM) network.

(3)

C)   Explain the properties of Fuzzy sets.

(3)

5)   Two fuzzy sets are given by

A)

$$R = \begin{array}{c} x_1 \\ x_2 \end{array} \begin{bmatrix} y_1 & y_2 \\ 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \qquad S = \begin{array}{c} y_1 \\ y_2 \end{array} \begin{bmatrix} z_1 & z_2 & z_3 \\ 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix}$$

(4)

Obtain the fuzzy relation T as composition (max-min and max product) between the fuzzy
relations.

B)   Explain the various types of crossover techniques in genetic algorithm.

(3)

C)   Describe the process of fuzzification and defuzzification.

(3)

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