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Supplementary Examination

Paper Name: Soft Computing **Paper Code: BTCSEAI DE12**
Time: 3 Hours **Maximum Marks: 75**

Note: Mobile Phones or programmable calculator or any equipment with memory are not allowed. Follow proper numbering for answering the questions.

Section- A
Attempt all the questions. Each question carries 5 marks

Q. No.	Question	CO	BL
1	Explain the backpropagation algorithm in detail.	CO3	BL4
2	Explain the steps involved in solving a problem using fuzzy logic concept.	CO2	BL1
3	What is meant by an activation function? Explain any three of them.	CO3	BL2
4	What is an optimization problem? Explain the steps in solving an optimization problem using Genetic Algorithm.	CO5	BL2
5	Explain the three learning techniques Give one example of each type.	CO4	BL1
6	With the help of a diagram, describe the ART network. Explain it's working algorithm also.	CO4	BL5
7	What are the limitations of single layer Perceptron in computing the logical functions? Suggest an alternative network to overcome the above limitations.	CO3	BL2

Section-B
Attempt any FOUR. Each question is of 10 marks

Q. No.	Question	CO	BL
1	Explain the concept of linear separability with the help of an example. How is this problem solved using Radial Basis Function?	CO3	BL2
2	Consider a fuzzy set A defined on the interval x = [0, 10] of integers by the membership function. $\mu A(x) = x/(x+3)$. What will be the α cut corresponding to $\alpha = 0.5$?	CO2	BL2
3	Two fuzzy sets, A and B are given as: A= {(1, 0.1), (2, 0.3), (3, 0.4), (4, 0.2), (5, 0.8), (6, 0.5), (7, 0.3), (8, 0.2)}	CO2	BL3

<table>
<tr><td></td><td>B= {(1, 0.4), (2, 0.8), (3, 0.5), (4, 0.3), (5, 0.6), (6, 0.9), (7, 1.0), (8, 0.5)
Define the fuzzy operators for negation (NOT), intersection (AND) and union (OR), and use them to calculate the following fuzzy sets:
(i) NOT B
(ii) A AND NOT (B)
(iii) A OR B</td><td></td><td></td></tr>
<tr><td>4</td><td>Implement OR function with bipolar inputs and targets using ADALINE network. Show the working for 2 iterations.</td><td>CO3</td><td>BL4</td></tr>
<tr><td>5</td><td>Assume we have the following function

$f(x) = x^3 - 60 * x^2 + 900 * x + 100$

where x is constrained to [0..31]. We wish to maximize f(x). Using a binary representation we can represent x using five binary digits.
(a) Given the following four chromosomes give the values for x and f(x). (2)

<table><tr><th>Chromosome</th><th>Binary String</th></tr><tr><td>P_1</td><td>11100</td></tr><tr><td>P_2</td><td>01111</td></tr><tr><td>P_3</td><td>10111</td></tr><tr><td>P_4</td><td>00100</td></tr></table>
(b) If P_3 and P_2 are chosen as parents and we apply one point crossover show the resulting children, C_1 and C_2. Use a crossover point of 1 (where 0 is to the very left of the chromosome). Do the same using P_4 and P_2 with a crossover point of 2 and create C_3 and C_4 (6)
(c) Calculate the value of x and f(x) for C_1 to C_4 (2)</td><td>CO5</td><td>BL5</td></tr>
<tr><td>6</td><td>Explain in detail the concept of Associative memory and Discrete Hopfield Network.</td><td>CO4</td><td>BL6</td></tr>
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