

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION MAY- 2025

B.Tech-VIII Semester (ECE)

COURSE CODE (CREDITS): 24B1WEM831(3)

MAX. MARKS: 35

COURSE NAME: SOFT COMPUTING PARADIGMS

COURSE INSTRUCTORS: Er.MUNISH SOOD

MAX. TIME: 2 Hours

**Note:** (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks																		
Q1	Implement AND gate using Widrow Hoff Delta learning rule for artificial neural networks.	4	5																		
Q2	Construct a kohonen self organizing map to cluster 4 given vectors [0 0 1 1],[1 0 0 0],[0 1 1 0],[0 0 0 1]. Number of cluster to be formed are 2, assume initial learning rate of 0.5	3	5																		
Q3	Using Hebb's rule find weights required to perform the following classification of given input pattern. '+' symbol represents the value +1 and empty symbol equals -1. Consider " I " belongs to the members of the class and hence target value = 1 and " O " does not belong to the members of the class and hence target value = -1. <div><table><tr><td>+</td><td></td><td>+</td></tr><tr><td></td><td>+</td><td></td></tr><tr><td>+</td><td></td><td>+</td></tr></table><p>"I"</p></div> <div><table><tr><td>+</td><td>+</td><td>+</td></tr><tr><td></td><td></td><td></td></tr><tr><td>+</td><td>+</td><td>+</td></tr></table><p>"O"</p></div>	+		+		+		+		+	+	+	+				+	+	+	3	5
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Q4	Consider an Adaptive resonance theory type 1 (ART-1) net with 5 input units and 3 cluster units. After some training the net attains the bottom-up $B_{3 \times 5}$ and top-down $T_{3 \times 5}$ weight matrices as shown below. Show the behavior of the net if it is presented with the training pattern $s = [0,1,1,1,1]$ . Assume learning rate $L=2$ and vigilance parameter $\rho=0.8$ . $B_{5 \times 3} = \begin{bmatrix} 0.2 & 0 & 0 \\ 0.5 & 0.8 & 0.8 \\ 0.5 & 0.5 & 0.5 \\ 0.5 & 0.8 & 0.8 \\ 0.1 & 0 & 0 \end{bmatrix} \quad T_{3 \times 5} = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix}$	4	5																		



Q5	Maximize the function $f(x) = x^2 - 1$ where x varies from 0 to 31, using Genetic Algorithm. Choose initial population size n=4.	3	5
Q6	Write short notes on <ul style="list-style-type: none"> <li>a) Mamdani Fuzzy inference System</li> <li>b) Kohonen self organizing maps</li> <li>c) Adaptive Resonance Theory</li> <li>d) Recurrent neural networks</li> <li>e) Hebb's Rule</li> </ul>	4	10