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प्रज्ञानं ब्रह्म



Manipal Institute of Technology, Manipal (Constituent Institute of Manipal University)



VII SEMESTER B.TECH(COMPUTER SCIENCE AND ENGINEERING) DEGREE END-SEMESTER EXAMINATIONS, NOV/DEC 2015

## SUBJECT: NEURAL NETWORKS AND FUZZY SYSTEMS (CSE 431) REVISED CREDIT SYSTEM Date: 08-12-2015

TIME: 3 HOURS

MAX.MARKS: 50

## Instructions to Candidates Answer ANY FIVE FULL questions.

✤ Missing data, if any, may be suitably assumed.

1A. Draw neat diagrams and explain the different neural network archite	ctures.
Give an example for each architecture.	6M
1B. Define sigmoid activation function. Design a neural network using	
Mc Culloch -Pitts neurons to realize the following logic function.	
$s(a1,a2,a3) = a1(a2+a3) + (a1a3+a2)^{c} + (a2+a3)^{c}a1$ . Use +1 or -1 for the	
synaptic weights. Write the truth table.	4M
2A. Write relevant equations and explain the following:	
i. Error correction learning.	
ii. Hebbian learning.	
iii. Boltzmann learning.	6M
2B. Explain the various pattern recognition tasks that can be performed by th	e
basic feedback neural networks.	4M
3A. Write the back propagation learning algorithm. What are the virtues and	
limitations of back propagation algorithm.	5M
3B. What is generalization?	2M
3C. What is orthogonality? Find if the following set of vectors are independent	nt.
sint cost $2\sin(t+\pi/3)$	3M

4A. What is principle component analysis? Explain. 4B. Consider the input/output prototype vectors shown below:	2M
P <sub>1</sub> <sup>T</sup> = [1 -1 1 1] $t_1^T$ = [-1 -1] $P_2^T$ = [1 1 -1 1] $t_2^T$ = [-1 1] P <sub>3</sub> <sup>T</sup> = [-1 -1 -1 1] $t_3^T$ = [1 -1]	
i. Apply the supervised Hebb rule and compute the weight matrix for the linear associator.	
ii. Calculate the output when the test input $P_k^T = [1 - 1 1 - 1]$ is applied. iii. Is the obtained output correct? Justify.	4M
4C. Apply the outstar rule on a pineapple recaller network and explain the performance.	4M
<ul><li>5A. Define a fuzzy set. Give one example each and explain the following:</li><li>i. Disjunctive sum of 2 fuzzy sets.</li><li>ii. Difference of 2 fuzzy sets.</li></ul>	6M
5B. Consider the fuzzy sets A and B defined on the interval X= [0, 5] of real numbers by the membership grade functions $\mu_A(x) = x/(x+1) \ \mu_B(x) = 2^{-x}$ Determine the mathematical formula and graph of membership grade function for the following:	ons
i. $A \cap B$ ii. $(A \cup B)^{C}$	4M
6A. Along with a neat diagram and relevant equations explain Hamming network.	4M
<ul><li>6B. Discuss Fuzzy Relations.</li><li>6C. Explain Self organized learning algorithm.</li></ul>	3M 3M

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