

10/12/2015

BE sem VII - Comp - CBGS - Soft Computing

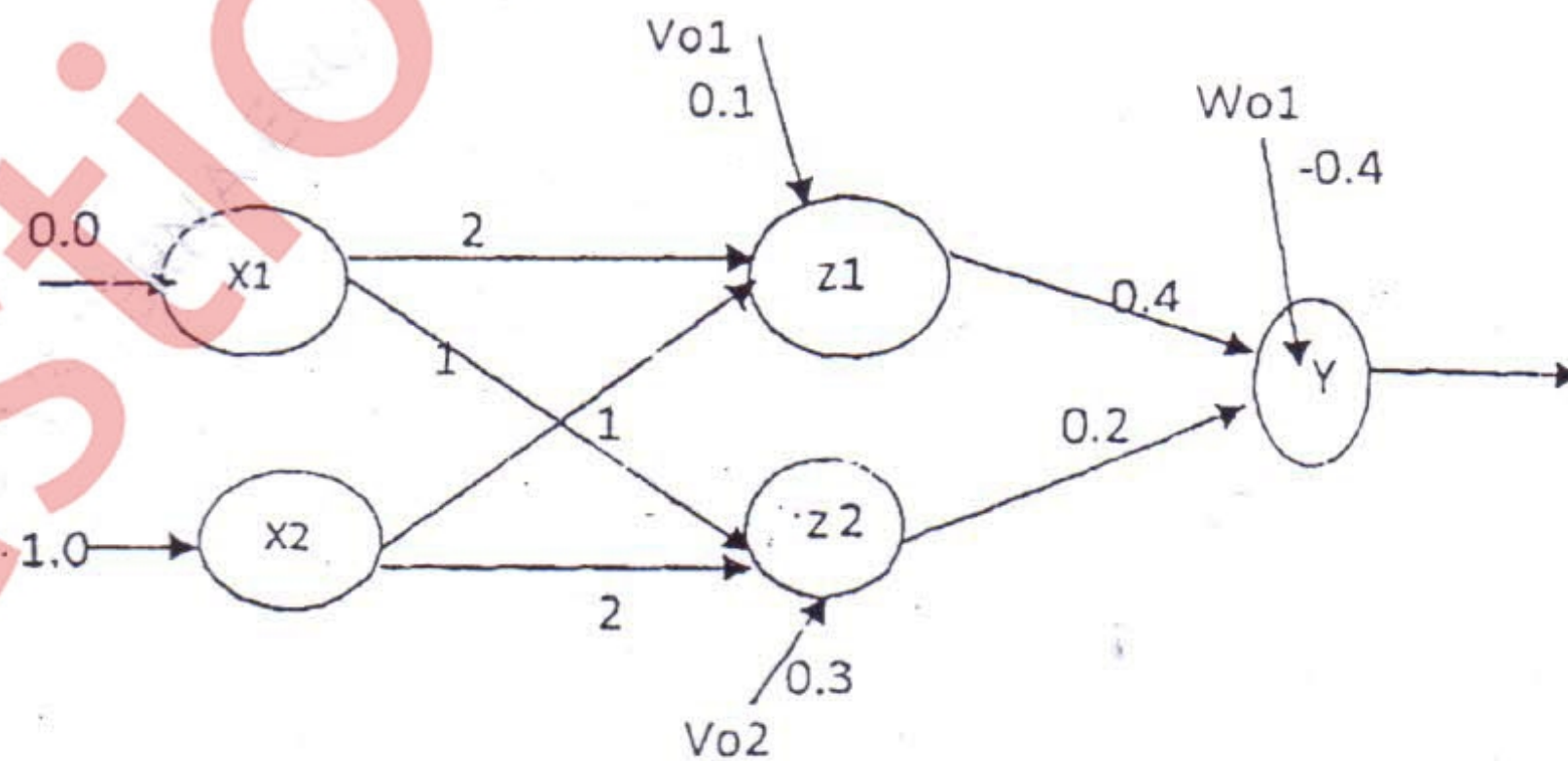
QP Code : 6000

(3 Hours)

[Total Marks : 80

- N.B. 1) Question No. 1 is compulsory  
2) Attempt any three questions out of remaining 5 questions  
3) Draw neat labeled diagram wherever necessary.

- 1 Solve any four : 20
- A Define soft computing? Distinguish between soft computing and hard computing.
  - B Determine (alpha)  $\alpha$  -level sets and strong  $\alpha$  -level sets for the following fuzzy set.  
 $A = \{(1, 0.2), (2, 0.5), (3, 0.8), (4, 1), (5, 0.7), (6, 0.3)\}$ ;
  - C Prove that the first order derivative of a unipolar continuous activation function is  $f'(net) = 0$  (1-0)
  - D Draw the five layer architecture of ANFIS and explain each layer in brief.
  - E What are the differences between derivative free and derivative based optimization.
  - F Distinguish between Supervised and Un-supervised learning
- 2 Design a fuzzy controller for a train approaching station. Inputs are speed and Distance and output is Break power. Use triangular membership function. Consider two descriptor for input and three descriptors for output. Derive a set of rules for control action and defuzzification. The design should be supported by figures wherever possible. Design a fuzzy controller for a train with high speed and small distance. 20
- 3 A Apply Backpropogation Algorithm to find the final weights for the following net. 10  
Inputs:  $x = [0.0, 1.0]$ , Weights between Hidden and Output Layers :  $w = [0.4, 0.2]$ , Bias on the Output Node O is  $W_o = [-0.4]$ , Weights between Input and Hidden Layer:  $v = [2, 1; 1, 2]$ , Bias on Hidden Unit nodes are  $V_o = [0.1, 0.3]$ , Desired output :  $d = 1.0$ ,



- B What is self-organizing map? Draw and explain architecture of Kohonen Self Organization Feature Map KSOFM. 10
- 4 A What are the different types of encoding, selection, crossover, mutations of GA. Explain each type with suitable examples 10
- B Explain with suitable examples Linearly and Non-linearly separable pattern classification 10

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- 5 A Explain Learning Vector Quantization Algorithm? 10
- B The formation of algal solutions in surface water is strongly dependent on pH of water, temperature and oxygen content. T is a set of water temperatures from a lake given by  $T = \{50, 55, 60\}$  and O is oxygen content values in water given by  $O = \{1, 2, 6\}$ . The fuzzy set of T is given by  $\{0.7/50 + 0.8/55 + 0.9/60\}$  and fuzzy set of O is given by  $\{0.1/1 + 0.6/2 + 0.8/6\}$
- Find  $R = T \times O$  for Given  $I = \{0.5/50 + 1/55 + 0.7/60\}$
  - Find  $S = I \circ R$  using max-product composition
  - Find  $S = I \circ R$  using max-min composition
- 6 Write short notes on any two: 20
- Steepest Descent algorithm
  - Newton Method
  - Fuzzy inference system