University of Mumbai

B.E Fourth Year 2015 - 2016 November

Semester 7 (BE Fourth Year)

Soft Computing

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B.E (Comp) Elective
Sem VII 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 (alfa) α -level sets and strong α -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)

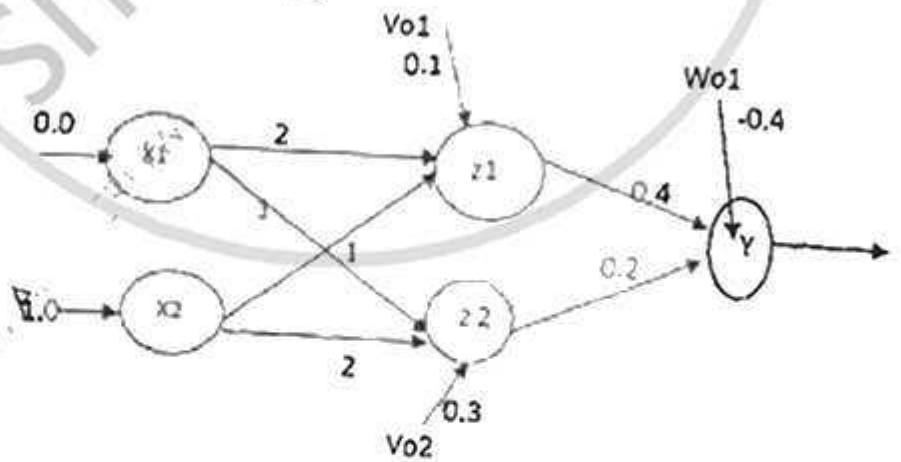
D Draw the five layer architecture of ANFIS and explain each layer in brief.

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 Wo= [-0.4], Weights between Input and Hidden Layer: v = [2,1 ;1,2], Bias on Hidden Unit nodes are Vo= [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

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}. 10

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}

i. Find R=T x O for Given I={0.5/50 + 1/55+ 0.7/60}
ii. Find S=I o R using max-product composition
iii. Find S= I o R using max-min composition

20

6 Write short notes on any two:
A Steepest Descent algorithm
B Newton Method
C Fuzzy inference system
