GANPAT UNIVERSITY

B. Tech. Semester: VII (Biomedical & Instrumentation) Engineering
CBCS Regular Examination November – December 2014
2BM705 Neural Networks & Fuzzy Logic

Time: 3 Hours **Total Marks: 70**

Instruction:
1. Write each section in separate answer book.
2. Figures to the right indicate marks.
3. Assume suitable data, if necessary.

Section – I

Que. – 1 12

a) What is the structure of fuzzy rule? Differentiate fuzzy rule and conventional rule by using appropriate example.

b) What is input data processing of fuzzy system? Explain input data processing to compute the heart attack risk of health insurance applicant.

OR

Que. – 1 12

a) Define 'Membership function'. Explain triangular membership function along with its mathematical proof.

b) Draw and explain interdependencies among basic problems and system analysis problems in fuzzy logic. How it is used in the field of medicine for diagnostic purpose?

Que. – 2 11

a) Assume that orange of various sizes are to be classified for the packaging purpose. Size is determined by weight. Represent for both crisp and fuzzy logic.

O1 = 155 g   O2 = 220 g   O3 = 92 g   O4 = 289 g   O5 = 44 g
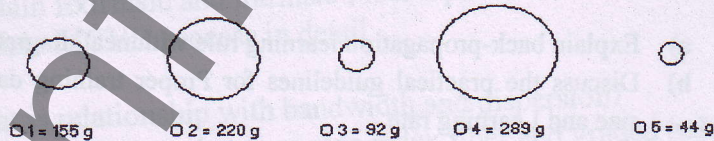
Oranges are labeled form O 1 to O 5 along with their weight in grams.
Draw the complement of membership value. Also draw the union and intersection of fuzzy set.

b) Enlist the fuzzy system design steps.

c) 'Fuzziness primarily describes uncertainty or partial truth' Justify your answer with example.

OR

Que. – 2 11

a) Explain the concept of Right Hand side computation in fuzzy inference engine.

b) What is the evaluation of antecedent of fuzzy variable? Explain the evaluation for single input data point using appropriate example.

Que. – 3   **12**

a) Design a fuzzy rule system for control the room temperature by controlling the fan speed. The variables and ranges are as follows:

Input Variable:

Room temperature (low, medium, high)   Range: 25 to 45 ºC

Output Variable:

Fan speed (slow, intermediate, fast)   Range: 0 to 2000 rpm

Represent the fuzzy out and crisp output for the single input data point.

b) Define following terms:
- i)   Linguistic variable   ii) Support
- iii) Core   iv) Cross over point
- v)   Normal fuzzy set   vi) Subnormal fuzzy set

Section – II

Que. – 4   **12**

a) Discuss Hebbian learning with pavlov's dog experiment.

b) Perform Training using perceptron learning rule for a single layer perceptron with bipolar hardlimit transfer function(-1,1) and learning rate n=1. Initial weight W=[0 ; 1 ; 0], x1=[2 ; 1 ; -1], x2=[0 ; -1 ; -1], d1 = -1, d2 = 1

OR

Que. – 4   **12**

a) State Hebb's Rule and perform 2 cycles of Hebbian learning for the given data. W=[1;0;0;0],x1=[1 ; 1;0;0],x2=[1;0;0;1],x3=[0;1;1;0], Use Hard limit Transfer function and Assume n=1

b) Explain following terms in detail:
- (1) Supervised learning
- (2) Unsupervised learning
- (3) Neural Network

Que. – 5   **11**

a) Explain back-propagation learning rule with neat diagram.

b) Discuss the practical guidelines for Proper training data set, Network size and Learning rate

OR

Que. – 5   **11**

a) Explain Perceptron Convergence theorem.

b) Explain the LMS learning rule using ADALINE. Show the error surface.

Que. – 6 Write Short note on following(Any Three)   **12**
- a) Applications of Back-Propagation Network
- b) Competitive Learning
- c) Boltzmann Learning
- d) Mc-Culloch Pitts model of neuron.

END OF PAPER