Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject Code: 173101 Date: 04/05/2015

Subject Name: Soft Computing

Time:02.30pm-05.00pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

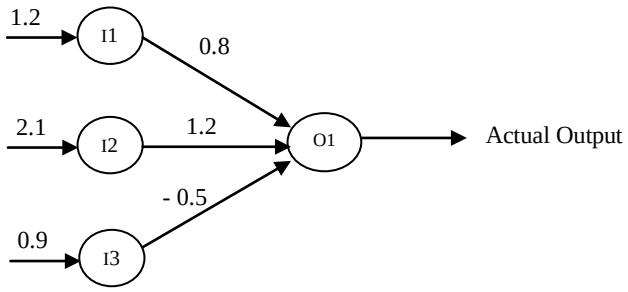
Q.1 **(a)** Discuss backpropagation networks in detail with neat sketches. **07**

(b) Explain various defuzzification methods in detail. **07**

Q.2 **(a)** What is unsupervised learning? Discuss Kohonen's self organizing networks in detail. **07**

(b) Enlist the limitation(s) of single layer Perceptron. Write assumption(s) if necessary and determine final weights W [w1, w2, w3] by applying perceptron training/learning algorithm for the following details (where I1, I2 and I3 are input nodes and O1 is output node): **07**

Initial weights W = [w1 w2 w3] = [0.8 1.2 -0.5]
Input X = [x1 x2 x3]= [1.2 2.1 0.9]
Desired output D = 1 and Learning rate = 0.6



OR

(b) Give the difference(s) between Crisp set and Fuzzy set. Also describe any four fuzzy set operations and apply the same operations on the following two fuzzy sets A and B. **07**

A = {(x1, 0.8), (x2, 1.0), (x3, 0.6) (x4, 0.2)}
B = {(x1, 0.9), (x2, 0.1), (x3, 0.6) (x4, 0.8)}

Q.3 **(a)** Enlist and discuss reproduction methods in genetic algorithm. **07**

(b) Assume three fuzzy relations R, S and T (given below). Check the correctness for the following property of max-min composition. **07**

R o (S o T) = (R o S) o T , where o is max-min composition.

$$R = \begin{pmatrix} 0.9 & 0.3 \\ 0.5 & 0.1 \end{pmatrix} \quad S = \begin{pmatrix} 0.1 & 0.4 \\ 0.2 & 0.7 \end{pmatrix} \quad T = \begin{pmatrix} 0.5 & 1.0 \\ 0.1 & 0.3 \end{pmatrix}$$

OR

Q.3 **(a)** Discuss crossover operation in genetic algorithm with its various types. Also apply the same types for the following two parents P1 and P2. (Make assumption(s) if necessary) **07**

P1 = 1 4 2 3 7 8 0 9 5 6
P2 = 0 6 9 1 3 2 8 5 4 7

(b) (1) Discuss competitive learning in brief. **04**
(2) Enlist and briefly explain different encoding methods in genetic algorithm. **03**

Q.4 **(a)** (1) State the differences between traditional algorithm and genetic algorithm. **04**
(2) Give brief discussion on Mamdani and Sugeno fuzzy inference models. **03**

(b) Elaborate Adaptive Neuro-Fuzzy Inference System with neat sketches. **07**

OR

Q.4 **(a)** (1) Describe the different activation functions in neural network. **04**
(2) What is Online Intelligent Systems? Discuss in brief. **03**

(b) State the difference(s) between Rough Set approach and Fuzzy Set approach. Discuss lower approximation and upper approximation in rough set with neat diagrams. Also support your answer with proper example. **07**

Q.5 **(a)** Write short notes on : **07**
- Concept formation in machine learning
- Learning by observation and discovery

(b) What do you mean by hybrid system? What is the need of such system(s), explain in brief. Also enlist and explain types of hybrid system. **07**

OR

Q.5 **(a)** (1) Write a brief note on : GA based weight optimization **04**
(2) Briefly explain sequence prediction in machine learning. **03**

(b) Discuss Hand-written English Character Recognition with the help of soft computing technique(s). **07**

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