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.**

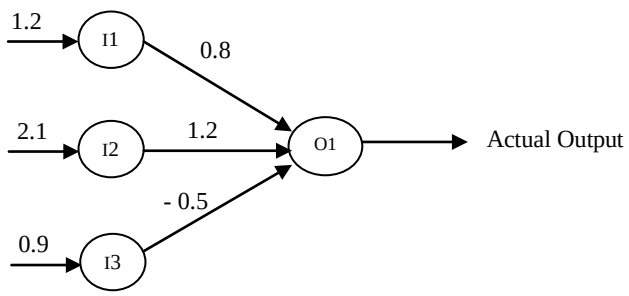
**Q.1** **(a)** Discuss backpropagation networks in detail with neat sketches. **07**

**(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**

| | | | |
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| **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)<br><br>P1 = 1 4 2 3 7 8 0 9 5 6<br>P2 = 0 6 9 1 3 2 8 5 4 7 | **07** |
| | **(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**

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|---|---|---|---|
| **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 :<br>- Concept formation in machine learning<br>- Learning by observation and discovery | **07** |
| | **(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**

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| **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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