Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. - SEMESTER – I • EXAMINATION – WINTER 2012**

**Subject code: 710427N Date: 16-01-2013**

**Subject Name: Soft Computing Technique and Its Application in Engineering (Elective)**

**Time: 02.30 pm – 05.00 pm Total Marks: 70**

## Instructions:

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

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|---|---|---|---|
| **Q.1** | **(a)** | Describe the various goals of soft computing. Explain in brief importance of various fields of soft computing. | **07** |
| | **(b)** | Enlist and explain basic fussy set operations with simple examples. | **07** |
| **Q.2** | **(a)** | What is generalization of neural networks? Explain useful properties and capabilities offered by neural networks. | **07** |
| | **(b)** | Describe in brief following factors affecting the performance of artificial neural network models. 1) Number of hidden Nodes 2) Range of normalization of training data. | **07** |
| | | **OR** | |
| | **(b)** | Discuss: "Initialization of interconnecting weights and type of activation function are important factors for successful training". | **07** |
| **Q.3** | **(a)** | Explain in brief the necessary steps for Back Propagation Learning algorithm. Clearly mentions all assumptions made. | **07** |
| | **(b)** | Draw and Explain ADLINE and MADLINE networks. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain selection of various parameters in back propagation network. | **07** |
| | **(b)** | Using Hebb rule, find the weights required to perform the following classifications: vectors (1 1 1 1) and (-1 1 -1 -1 ) are the members of the class (with target value 1); vectors(1 1 1 -1) and (1 -1 -1 1 )are the members of the class (with target value -1). Test the response of net for any two of the training vectors. Take initial weights and bias equal to zero. Also take activation function as bipolar step function with threshold = 0. | **07** |
| **Q.4** | **(a)** | What is the significance of fuzzy inference? Describe fuzzy rule base system with proper example. | **07** |
| | **(b)** | Explain various defuzzification methods. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | What is the difference between fuzzy and crisp sets? Enlist and define properties of fuzzy sets. | **07** |
| **Q.4** | **(b)** | What is adaptive control? Explain fuzzy PID control system in brief. | **07** |
| **Q.5** | **(a)** | Describe (in brief) following in context of Fuzzy systems. 1) Selection of fuzzy variables 2) Implication methods | **07** |
| | **(b)** | What is ANFIS? Explain its advantages and disadvantage. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Discuss the effects of cross over probability and mutation probabilities on GA performance. | **07** |
| | **(b)** | Discuss in brief - scope of ANN-GA-Fuzzy hybrid applications. | **07** |

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