International Islamic University Chittagong

Department of Electronic and Telecommunication Engineering

Final Examination, Autumn 2018

Course Code: ETE-4837/4713

Course Title: Neural Network and Fuzzy Logic/Artificial Neural Network

Full Marks: 50 Time: 2h 30min

[Answer any two from Group-A and any three from Group-B of the following questions]

Group-A

1.a) Write about Cover's theorem. 2

b) What does the term "Regularization Networks" mean in the context of machine learning and statistical learning theory? 3

c) What are the similarities and differences between multilayer perceptron (MLP) and radial basis function (RBF) networks? 5

2.a) Differentiate between fuzzy set and crisp set? Write about membership function? 2+2

b) Write down the short note about 3

(i) Fuzzy relational operators (ii) Fuzzy union (iii) Fuzzy reasoning

c) 3

Consider the following two fuzzy sets $\tilde{A}$ and $\tilde{B}$

$$\tilde{A} = \{(x_1, 0.2), (x_2, 0.8), (x_3, 0.4)\}$$

$$\tilde{B} = \{(x_1, 0.4), (x_2, 0), (x_3, 0.1)\}$$

Evaluate their product.

3.a) 5

For two fuzzy sets $\tilde{A}$ and $\tilde{B}$

$$\tilde{A} = \{(x_1, 0.2), (x_2, 0.5), (x_3, 0.6)\}$$

$$\tilde{B} = \{(x_1, 0.9), (x_2, 0.6), (x_3, 0.5)\}$$

Prove that

$$(\tilde{A} \cap \tilde{B}^c) = \tilde{A} - \tilde{B}$$

b) For two fuzzy sets 5

$$\tilde{A} = \{(x_1, 0.4), (x_2, 0.8), (x_3, 0.6)\}$$

$$\tilde{B} = \{(x_1, 0.2), (x_2, 0.6), (x_3, 0.9)\}.$$

Evaluate,

$$\tilde{A} \oplus \tilde{B}$$

Group-B

4.a)	Explain Mamdani Fuzzy Inference System and Takagi-Sugeno Fuzzy Inference Model (TS Method) with figure.	**5+3**
b)	Explain the characteristics of Fuzzy Inference System.	**2**
5.a)	Describe the concept of genetic algorithms.	**3**
b)	Write about Evolutionary Computation (EC) and Evolutionary Algorithms (EAs).	**3**
c)	Define optimization. Explain the factors around which optimization problem is centered?	**1+3**
6.a)	Construct the flowchart for genetic programming.	**6**
b)	Write short notes on the following from neural network and fuzzy logic perspective: (i) Compunction engineering (ii) Biomedical engineering	**4**
7.a)	Explain the applications of neural networks.	**5**
b)	Explain the applications of fuzzy systems.	**5**