International Islamic University Chittagong

Department of Electronic and Telecommunication Engineering

Final Examination, Spring-2019

Course Code: ETE-4837/4713 Course Title: Neural Networks and Fuzzy Logic

Full Marks: 50 Time: 2h 30min

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

PART-A

1.a) Explain Radial Functions. 4

b) Write about Ill-Posed and Well-Posed Problems. 3

c) Briefly write about the selection of the RBF. 3

2.a) Outline ternary, quarternary and quinary relation? Explain fuzzy relation with an example. 3+2

b) Let 5

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

$\tilde{B} = \{(x_1, 0.4), (x_1, 0), (x_1, 0.1)\}$. Evaluate $\mu_{\tilde{A}.\tilde{B}}(x)$

and $\mu_{\tilde{A} \cap \tilde{B}}$.

3.a) The task is to recognize English alphabetical characters (F, E, X, Y, I, T) in an image processing system. 10

Define two fuzzy sets $\tilde{I}$ and $\tilde{F}$ to represent the identification of characters I and F.

$$\tilde{I} = \{(F, 0.4), (E, 0.3), (X, 0.1), (Y, 0.1), (I, 0.9), (T, 0.8)\}$$

$$\tilde{F} = \{(F, 0.99), (E, 0.8), (X, 0.1), (Y, 0.2), (I, 0.5), (T, 0.5)\}$$

Evaluate the following,

i. $\tilde{I} \cup \tilde{F}$

ii. $\tilde{I} - \tilde{F}$

iii. $\tilde{F} \cup \tilde{F}^C$

iv. $(\tilde{I} \cup \tilde{F})^C = \tilde{I}^C \cap \tilde{F}^C$

PART-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) Show : 2+2+3

i) Taxonomy of search optimization techniques.

ii) General scheme of Evolutionary Process

iii) Operators of genetic algorithm

b) Write about Evolutionary Computation (EC) and Evolutionary Algorithms (EAs). 3

6.a) Point out the application of neural network in the following: 4
(a)|Pattern recognition
(b)Optimization
(c)Control system

b) What is optimization? Describe how genetic algorithm is related to optimization 3

c) Write short notes on the following 3
(i) Particle swarm optimization
(b) Encoding and Decoding fitness functions

7.a) Explain the applications of neural networks. 5

b) Explain the applications of fuzzy systems. 5