

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY  
SECOND SEMESTER M.TECH DEGREE EXAMINATION, APRIL/MAY 2018

**ELECTRICAL & ELECTRONICS ENGINEERING**

1. Control Systems.
2. Guidance and Navigational Control
3. Electrical Machines
4. Power Systems
5. Power Control & Drives
6. Power System and Control



**01EE6126: SOFT COMPUTING TECHNIQUES**

Answer *any two full* questions from *each* part

Limit answers to the required points.

Max. Marks: 60

Duration: 3 hours

**PART A**

1. a. Draw and explain how biological signals are transmitted in a neuron. (5 marks)
- b. Realize using McCulloch Pitts neuron model (i) a 2-input AND logic and (ii) a 2-input NOR logic considering +1 as the bias value of the neuron. (4 marks)
2. a. Explain briefly error-correction learning algorithm. (4 marks)
- b. What is meant by feed forward network? Compare SLFFN and MLFFN. (5 marks)
3. a. Draw the non-linear model of a neuron and explain the basic elements of the neuronal model. (4 marks)
- b. Write the steps and draw the signal flow graph representation of LMS algorithm. (5 marks)

**(2 × 9 = 18 marks)**

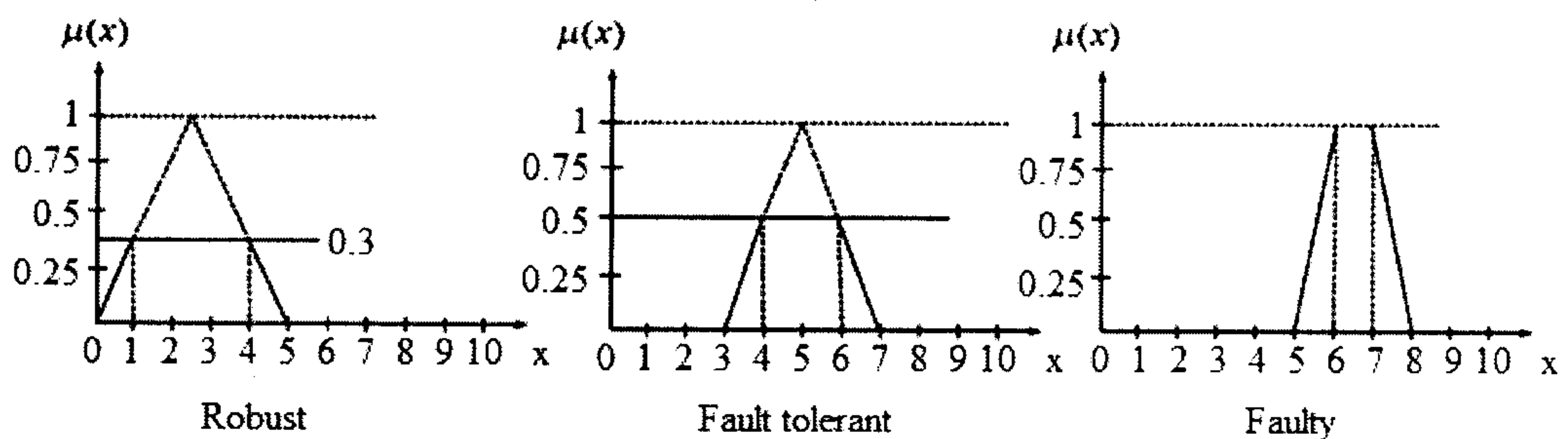
**PART B**

4. a. P represents a set of four varieties of paddy plants, D represents the four diseases affecting the plants, and S represents the common symptoms of the diseases.  $P = \{P_1, P_2, P_3, P_4\}$ ,  $D = \{D_1, D_2, D_3, D_4\}$ ,  $S = \{S_1, S_2, S_3, S_4\}$ . R is a relation on  $P \times D$  representing which plant is susceptible to which diseases and T is another relation on  $D \times S$  and is stated as

$$R = \begin{matrix} & D_1 & D_2 & D_3 & D_4 \\ \begin{matrix} P_1 \\ P_2 \\ P_3 \\ P_4 \end{matrix} & \begin{bmatrix} 0.6 & 0.6 & 0.9 & 0.8 \\ 0.1 & 0.2 & 0.9 & 0.8 \\ 0.9 & 0.3 & 0.4 & 0.8 \\ 0.9 & 0.8 & 0.4 & 0.2 \end{bmatrix} \end{matrix}, \quad T = \begin{matrix} & S_1 & S_2 & S_3 & S_4 \\ \begin{matrix} D_1 \\ D_2 \\ D_3 \\ D_4 \end{matrix} & \begin{bmatrix} 0.1 & 0.2 & 0.7 & 0.9 \\ 1 & 1 & 1 & 0.6 \\ 0 & 0 & 0.5 & 0.9 \\ 0.9 & 1 & 0.8 & 0.2 \end{bmatrix} \end{matrix}$$

Obtain the association of plants with the different symptoms of the disease using max-min composition. (5 marks)

- b. Discuss any two common membership functions used in fuzzy logic. (4 marks)
5. a.  $\tilde{A} = \{(x_1, 0.3), (x_2, 0.5), (x_3, 0.6)\}$ ,  $\tilde{B} = \{(x_1, 0.2), (x_2, 0.8), (x_3, 0.9)\}$ . Find (i)  $\tilde{A} \cup \tilde{B}$  (ii)  $\tilde{A} \cap \tilde{B}$  (iii)  $\tilde{A} - \tilde{B}$  (iv)  $\tilde{A} \oplus \tilde{B}$  (4 marks)
- b. List out the various operations on Fuzzy sets. (5 marks)
6. a. Explain simple fuzzy logic controllers. (4 marks)
- b. The faulty measure of a circuit is defined fuzzily by three fuzzy sets namely Robust (R), Fault tolerant (FT) and Faulty (F), defined by three membership functions with number of faults occur, as universe of discourse as



Reliability is measured as  $r = R \cup FT \cup F$ . Determine the crisp value of  $r$  using centroid method, COS method and weighted average methods of defuzzification. (5 marks)

(2 × 9 = 18 marks)

### PART C

7. a. What is Genetic Algorithm? What are the various methods of selecting chromosomes of parents to crossover? (6 marks)
- b. What is crossover? Explain any three types of crossover operators in GA. (6 marks)
8. a. Explain Neuro-genetic systems. (6 marks)

- b. What is meant by mutation? Give any three methods of mutation used in GA? (6 marks)
9. a. Draw and explain the structure of ANFIS. (8 marks)
- b. What are Fuzzy genetic systems? (4 marks)
- (2 × 12 = 24 marks)

