

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: CS361**

**Course Name: SOFT COMPUTING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 3 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | Describe the importance of Back Propagation Network.           | (3) |
| 2 | Write three application scope of the Neural Network.           | (3) |
| 3 | Explain Perceptron Training Algorithm for Single Output Class. | (3) |
| 4 | What is Activation Function and write its importance.          | (3) |

**PART B**

*Answer any two full questions, each carries 9 marks.*

- |   |   |     |
|---|---|-----|
| 5 | a) Implement ANDNOT function using McCulloch-Pitts neuron model.<br>(Use binary data representation). | (7) |
|   | b) Differentiate between Hard Computing and Soft Computing.   | (2) |
| 6 | a) Explain the training algorithm for Hebb Network.   | (6) |
|   | b) Write the learning factors of Back Propagation Network.  | (3) |
| 7 | a) With the help of an example explain Supervised, Unsupervised, Reinforcement learning.              | (6) |
|   | b) What is ADALINE . Why it is trained using least mean square rule.                                  | (3) |

**PART C**

*Answer all questions, each carries 3 marks.*

- |    |  |     |
|----|--|-----|
| 8  | Represent the standard fuzzy set operations using Venn diagram.  | (3) |
| 9  | Why the excluded middle law does not get satisfied in fuzzy logic.   | (3) |
| 10 | Describe the features of membership function.  | (3) |
| 11 | Consider the discrete fuzzy set defined on the universe $X = \{a, b, c, d, e\}$ as<br>$A = \left\{ \frac{1}{a} + \frac{0.9}{b} + \frac{0.6}{c} + \frac{0.3}{d} + \frac{0}{e} \right\}$ . Using Zadeh's notation, find the $\lambda$ - cut sets for $\lambda = 0.6, 0.3, 0^+$ . | (3) |

**PART D**

*Answer any two full questions, each carries 9 marks.*

- |    |  |     |
|----|--|-----|
| 12 | a) Using the inference approach, obtain the membership values for the triangular shapes, (I,R,T) for a triangle with angles $40^\circ, 60^\circ, 80^\circ$ . | (6) |
|    | b) What is cardinality of a fuzzy set. Whether a power set can be formed for a fuzzy set. Justify your answer.   | (3) |

- 13 a) Differentiate the following (3)
- (a) Convex and Nonconvex Fuzzy Set.
- (b) Normal and Subnormal Fuzzy Set.
- b) For a speed control of DC motor, the membership function of series resistance, (6)
- armature current and speed are given as follows
- $$\mathbf{R}_{se} = \left\{ \frac{0.4}{30} + \frac{0.6}{60} + \frac{1.0}{100} + \frac{0.1}{120} \right\}$$
- $$\mathbf{I}_a = \left\{ \frac{0.2}{20} + \frac{0.3}{40} + \frac{0.6}{60} + \frac{0.8}{80} + \frac{1.0}{100} + \frac{0.2}{120} \right\}$$
- $$\mathbf{N} = \left\{ \frac{0.35}{500} + \frac{0.67}{1000} + \frac{0.97}{1500} + \frac{0.25}{1800} \right\}$$
- Compute relation T for relating series resistance to motor speed ie  $R_{se}$  to N. Perform max-min composition.
- 14 Explain different defuzzification methods. (9)

### PART E

*Answer any four full questions, each carries 10 marks.*

- 15 a) With the help of a block diagram explain Genetic Neuro Hybrid Systems. (6)
- b) Write a note on Fuzzy Qualifiers. (4)
- 16 a) Explain the methods used for decomposing compound linguistic rules into simple (6)
- canonical rules.
- b) Explain the steps of Genetic Algorithm. (4)
- 17 a) Describe two methods used for Aggregation of Fuzzy Rules. (3)
- b) Write any three advantages of Neuro- Genetic hybrid system. (3)
- c) Explain Value Encoding and Permutation Encoding with example. (4)
- 18 a) Explain stopping condition for Genetic Algorithm. (5)
- b) Describe 5 types of Crossover. (5)
- 19 a) Distinguish between Mamdani FIS and Sugeno FIS. (6)
- b) Explain Stochastic Universal Sampling with example. (4)
- 20 a) Explain the following terms (10)
- (a) Cooperative Neural Fuzzy Systems
- (b) General Neuro Fuzzy Hybrid Systems

\*\*\*\*