

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.

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| 5 | a) Implement ANDNOT function using McCulloch-Pitts neuron model.
(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.

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| 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
$A = \left\{ \frac{1}{a} + \frac{0.9}{b} + \frac{0.6}{c} + \frac{0.3}{d} + \frac{0}{e} \right\}$. Using Zadeh's notation, find the λ - cut sets for $\lambda = 0.6, 0.3, 0^+$. | (3) |

PART D

Answer any two full questions, each carries 9 marks.

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| 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, armature current and speed are given as follows (6)

$$R_{se} = \left\{ \frac{0.4}{30} + \frac{0.6}{60} + \frac{1.0}{100} + \frac{0.1}{120} \right\}$$

$$I_a = \left\{ \frac{0.2}{20} + \frac{0.3}{40} + \frac{0.6}{60} + \frac{0.8}{80} + \frac{1.0}{100} + \frac{0.2}{120} \right\}$$

$$N = \left\{ \frac{0.35}{500} + \frac{0.67}{1000} + \frac{0.97}{1500} + \frac{0.25}{1800} \right\}$$

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 canonical rules. (6)
 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
