

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CS361

Course Name: SOFT COMPUTING

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

- | | | Marks |
|---|--|-------|
| 1 | Compare feed forward and feedback networks. | (3) |
| 2 | Why McCulloch-Pitts neuron widely used in logic functions? | (3) |
| 3 | Explain the concept of Widrow-Hoff rule. | (3) |
| 4 | State the significance of error portion δ_k and δ_j in Back Propagation Network. | (3) |

PART B

Answer any two full questions, each carries 9 marks.

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|---|---|-----|
| 5 | Implement AND function using bipolar inputs and targets using Hebb rule method. | (9) |
| 6 | Implement OR function using perceptron training algorithm with binary inputs and bipolar targets. | (9) |
| 7 | a) Explain training algorithm used in adaptive linear neuron. | (5) |
| | b) Implement AND function using McCulloch-Pitts neuron (using binary data representation). | (4) |

PART C

Answer all questions, each carries 3 marks.

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|----|--|-----|
| 8 | Distinguish between fuzzy and probability with example. | (3) |
| 9 | Explain any two methods of composition techniques on fuzzy relations with examples | (3) |
| 10 | State the relevance of fuzzification. Explain different types. | (3) |
| 11 | Using the intuition method develop fuzzy membership functions for the following shapes.
(a) Trapezoid. (b) Gaussian function. (c) Isosceles triangle. | (3) |

PART D

Answer any two full questions, each carries 9 marks.

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| 12 | a) Consider the two fuzzy sets
$A = \left\{ \frac{0}{0.2} + \frac{0.8}{0.4} + \frac{1}{0.6} \right\} \quad B = \left\{ \frac{0.9}{0.2} + \frac{0.7}{0.4} + \frac{0.3}{0.6} \right\}$ Using Zadeh's notation express the fuzzy sets into λ - cut sets for $\lambda = 0.4$ for the following operations.
(i) $A \cap B$ (ii) $A \cup B$ (iii) $\overline{A} \cup \overline{B}$ (iv) $\overline{A} \cap \overline{B}$ (v) $\overline{\overline{B}}$ | (5) |
| | b) Explain the features of fuzzy membership functions with proper diagrams. | (4) |
| 13 | a) Consider the three fuzzy sets | (5) |

$$\underset{\sim}{A} = \left\{ \frac{0.7}{50} + \frac{0.8}{55} + \frac{.9}{60} \right\}, \quad \underset{\sim}{B} = \left\{ \frac{0.1}{1} + \frac{0.6}{2} + \frac{0.8}{6} \right\}, \quad \underset{\sim}{C} = \left\{ \frac{0.5}{50} + \frac{1}{55} + \frac{0.7}{60} \right\}$$

Find

(i) $R = A \times B$

(ii) $\underset{\sim}{S} = \underset{\sim}{C} \circ \underset{\sim}{R}$ using max product composition.

- b) Using the inference approach, find the membership values for the triangular shapes I_{\sim} , R_{\sim} , E_{\sim} , IR_{\sim} for a triangle with angles 45° , 55° and 80° . (4)

- 14 a) Explain any five defuzzification methods. (5)

- b) Consider the following two fuzzy sets.

$$\underset{\sim}{A} = \left\{ \frac{0.2}{1} + \frac{0.3}{2} + \frac{0.4}{3} + \frac{1}{4} \right\} \quad \underset{\sim}{B} = \left\{ \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.3}{3} + \frac{0.5}{4} \right\} \quad (4)$$

Find the algebraic sum, algebraic product, bounded sum & bounded difference.

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) Mention the stopping condition for genetic algorithm flow. (5)
 b) Difference between uniform and three parent cross over. (5)
- 16 Define Fuzzy Propositions. Explain different fuzzy propositions. (10)
- 17 a) Mention the general forms that exist for a linguistic variable. (5)
 b) Differentiate between Mamdani FIS and Sugeno FIS. (5)
- 18 Explain the characteristics and different classifications of a neuro-fuzzy hybrid system. (10)
- 19 Explain different types of Encoding Techniques. (10)
- 20 Compare genetic learning of rule bases and knowledge bases. (10)
