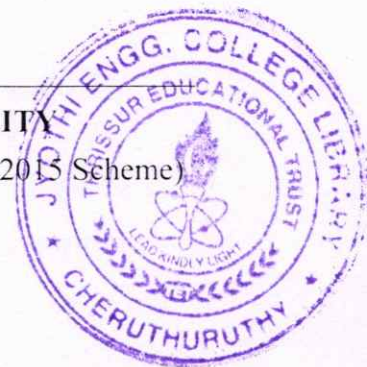


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (S, FE) / S5 (PT) (S,FE) Examination June 2024 (2015 Scheme)

**Course Code: CS361****Course Name: SOFT COMPUTING**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 3 marks.*

Marks

- 1 List the commonly used activation functions. Define the necessity of activation functions (3)
- 2 Define different learning methods in artificial neural network. (3)
- 3 Define the Perceptron learning rule. (3)
- 4 What is meant by excitatory and inhibitory weighted interconnections. (3)

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

- 5 a) Obtain the net input for a network with inputs given as $[x_1, x_2, x_3] = [0.8, 0.6, 0.4]$ and the weights are $[w_1, w_2, w_3] = [0.1, 0.3, -0.2]$ with bias = 0.35. (5)
Also find output for :i) Binary sigmoidal and ii) Bipolar sigmoidal
- b) Implement OR function using MP neuron. (4)
- 6 a) Explain the training algorithm of perceptron network with AND function (9)
- 7 a) Explain the training algorithm of back-propagation network. (5)
- b) What is the role of Widrow-Hoff rule in Adaptive Linear neuron with proper equation? (4)

PART C*Answer all questions, each carries 3 marks.*

- 8 Fuzzy sets do not hold the law of contradiction and law of excluded middle. (3)
Justify with respect to crisp set.
- 9 Explain the features of membership functions. (3)
- 10 For a fuzzy relation R. (3)

$$R = \begin{bmatrix} 1 & 0.2 & 0.3 \\ 0.5 & 0.9 & 0.6 \\ 0.4 & 0.8 & 0.7 \end{bmatrix}$$

find the λ -cut relations for the following values $\lambda = 0.2$ and $\lambda = 0.9$

- 11 Define the method that uses max membership principle for defuzzification. (3)

PART D

Answer any two full questions, each carries 9 marks.

- 12 a) Differentiate the operation on fuzzy set and crisp sets with examples (5)
 b) Explain any two methods of membership value assignment (4)
- 13 a) Using intuition and your own definition of the universe of discourse, plot fuzzy membership functions for the weight of the people: (5)
 Very Thin, Thin, Average, Stout, Very Stout.
 b) Explain the different types of fuzzy set. (4)
- 14 a) Compare any two defuzzification methods (5)
 b) Given two fuzzy set: (4)
 $\underline{A} = \{ (x_1, 0.2), (x_2, 0.5), (x_3, 0.6), (x_4, 0.8), (x_5, 1.0) \}$
 $\underline{B} = \{ (x_1, 0.8), (x_2, 0.6), (x_3, 0.4), (x_4, 0.2), (x_5, 0.1) \}$
 Perform union, intersection and complement operations.

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) Explain about Mamdani fuzzy inference system and Takagi Sugeno fuzzy inference system. (7)
 b) Describe fuzzy rule formation (3)
- 16 a) Explain the methods used for decomposition of compound linguistic rules into simple canonical rules. (5)
 b) Describe fuzzy aggregation of rules (5)
- 17 a) Explain Cooperative neural fuzzy system with diagram. (5)
 b) Describe fuzzy propositions. (5)
- 18 a) Explain the operators in Genetic Algorithm (GA) with flow chart? (7)
 b) Describe different mutation types in GA. (3)
- 19 a) Explain different types of encoding used to represent individual genes. (5)
 b) Explain genetic neuro hybrid systems with diagram. (5)
- 20 a) Differentiate, any two selection techniques in GA with example. (5)
 b) Describe the stopping conditions for GA. (5)
