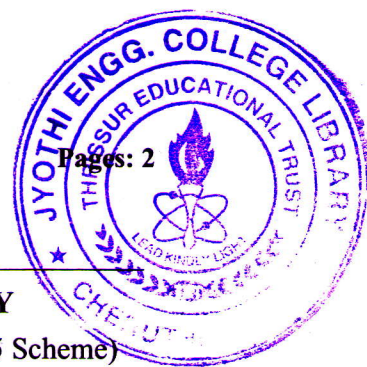


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

**Course Code: EC360****Course Name: SOFT COMPUTING**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Compare and contrast soft computing with hard computing? Mention some of the applications of soft computing (7)
- b) Explain the terms support, singleton, normal and crossover point with respect to a fuzzy set. (8)
- 2 a) Determine α -cuts of the given fuzzy set A. (7)

$$\mu_A(x) = \begin{cases} \frac{1}{1+(x-10)^2} & \text{for } \alpha = 0.2, 0.5; X = [0, \infty] \end{cases}$$

- b) Given fuzzy sets A and B as (8)

$$\mu_A(x) = \begin{cases} (x-2)/3 & 2 \leq x \leq 5 \\ (8-x)/3 & 5 < x \leq 8 \end{cases}, \quad \mu_B(x) = \begin{cases} (x-3)/3 & 3 \leq x \leq 6 \\ (9-x)/3 & 6 < x \leq 9 \end{cases}$$

Determine $A \cup B$ and $A \cap B$

- 3 a) Given fuzzy sets A and B as (8)
- $A = \{0.2/1 + 0.9/2 + 0.7/3 + 0.6/4 + 0.1/5\}$ and
- $B = \{0.3/1 + 1.0/2 + 0.5/3 + 0.4/4 + 0.1/5\}$.
- Compute (i) The subethood value $S(A,B)$ and $S(B,A)$ also (ii) their fuzzy similarity measure $E(A,B)$.
- b) Sets A and B defined on the universe of discourse X. (7)
- $A = \{0.7/-2 + 1.0/-1 + 0.7/1 + 0.5/2 + 0.6/3\}$
- Let A is mapped to B through a function $f(x) = 2|x| + x$. Find fuzzy set B based on extension principle.

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Let R denotes fuzzy relation (7)

$$R(X, Y) = \begin{bmatrix} 0.3 & 0 & 0.7 & 0 \\ 0 & 1 & 0.9 & 0.6 \\ 0.2 & 0 & 0.5 & 0 \\ 0 & 0.3 & 0 & 1 \end{bmatrix}$$

- (i) What are the domain, range, and height of $R(X, Y)$?
 (ii) Express $R(X, Y)$ in its resolution form.
- b) With a block schematic describe the Fuzzy Inference system. Also explain the 'Centroid' de-fuzzification method. (8)
- 5 a) Draw and explain the concept of mathematical model of an artificial neuron and list the commonly used activation functions. (8)
- b) Briefly explain the different learning paradigms in Artificial Neural Networks. (7)
- 6 a) Explain the architecture of McCulloch Pitts Neuron. (7)
- b) Implement AND and NAND functions using Mc Culloh Pitts Neuron. (8)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Using the linear separability concept, obtain the response for AND function (5)
- b) Explain perceptron learning rule. (7)
- c) Find the weights of a perceptron network for AND and OR function. (8)
- 8 a) Draw the architecture of multilayer perceptron network. (5)
- b) What are the preconditions for backpropagation algorithm? (5)
- c) Derive the back propagation algorithm. (10)
- 9 a) What are genetic algorithms and how are they different from traditional methods (5)
- b) With a neat flow chart, explain the operation of simple genetic algorithm. (10)
- c) Discuss the Applications of Genetic Algorithm. (5)
