JYOTHI ENGG. COLLEGE LIBRARY
THRISSUR EDUCATIONAL TRUST
LEAD KINDLY LIGHT
CHERUTHURUTHY

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (S,FE) Examinations September 2026 (2019 Scheme)

Course Code: CST444
Course Name: SOFT COMPUTING

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1 Point out the difference between hard computing and soft computing. (3)

2 Discuss the significance of bias in an Artificial Neural Network and its effect on the net output, with a suitable example. (3)

3 Outline the stages involved in the Backpropagation network. (3)

4 State the delta rule used for weight updation in Adaline networks. (3)

5 Using a neat diagram, explain the features of fuzzy membership functions. (3)

6 Let A={(x1,1), (x2,0.3), (x3,0.5)} and B={(x1,0.5), (x2,0.4), (x3,0.1)} (3)

Find intersection, union and complement of both the fuzzy sets.

7 Illustrate the steps of a Genetic Algorithm using a neat flowchart. (3)

8 Explain Single-Point Crossover and Two-Point Crossover with example. (3)

9 Describe the properties of dominance relation. (3)

10 List the various advantages of Genetic-neuro hybrid systems. (3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11 a) Demonstrate AND Function Using M-P Neuron Model. Draw the architecture of the output network and threshold conditions. (8)

b) Explain about different types of learning with example. (6)

OR

12 a) Using the Hebb rule, implement the OR function using bipolar inputs and targets (9)

b) Elaborate about different types of neural network connections with suitable diagrams (5)

Module II

13 a) Design a Perceptron model to realize the AND function with binary inputs and bipolar target values. (8)

b) Explain how training and testing are carried out in an Adaptive Linear Neuron model. (6)

OR

14 a) Apply the ADALINE learning algorithm to train the OR gate with bipolar inputs and outputs. Carry out two training epochs. (9)

b) How is error propagated in backpropagation network? Explain the phase II of BPN training algorithm. (5)

Module III

15 a) Explain the concept of defuzzification and discuss the commonly used defuzzification methods with examples. (9)

b) List the properties of fuzzy set. (5)

OR

16 a) Define composition operation in fuzzy relations? Two fuzzy relations R and S are given below. Obtain the composition T of these fuzzy relations using (8)

$$R = \begin{array}{c} \\ x1 \\ x2 \end{array} \begin{array}{c} \begin{array}{cc} y1 & y2 \end{array} \\ \begin{bmatrix} .5 & .2 \\ .3 & .8 \end{bmatrix} \end{array} \qquad S = \begin{array}{c} \\ y1 \\ y2 \end{array} \begin{array}{c} \begin{array}{ccc} z1 & z2 & z3 \end{array} \\ \begin{bmatrix} 1 & .5 & .2 \\ .8 & .4 & .6 \end{bmatrix} \end{array}$$

i)Max-min composition ii)Max-product composition

b) Consider the following two fuzzy sets I and R: (6)

$$\mu_I = \left\{ \frac{0}{0} + \frac{0.2}{1} + \frac{0.7}{2} + \frac{0.8}{3} + \frac{0.9}{4} + \frac{1}{5} \right\}$$

$$\mu_R = \left\{ \frac{0}{0} + \frac{0.1}{1} + \frac{0.3}{2} + \frac{0.2}{3} + \frac{0.4}{4} + \frac{0.5}{5} \right\}$$

Find the (i) algebraic sum, (ii) algebraic product, (iii) bounded sum, and (iv) bounded difference for the given sets.

Module IV

17 a) With a neat block diagram, describe the architecture and working of a Fuzzy Inference System. (6)

b) Explain any four encoding schemes used in Genetic Algorithms. (8)

OR

18 a) Illustrate Mamdani FIS with an example. (8)

b) Describe four mutation techniques in Genetic Algorithms. (6)

Module V

19 a) Discuss the characteristics of neuro-fuzzy hybrid systems and explain their classifications. (9)

b) What do you understand by Pareto optimality? (5)

OR

20 a) Present the mathematical form of MOOP and illustrate the different classes of multi-objective optimization problems. (8)

b) Outline the steps involved in identifying non-dominated solutions in multi-objective optimization problems. (6)

***