

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Supplementary Examination October 2023 (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

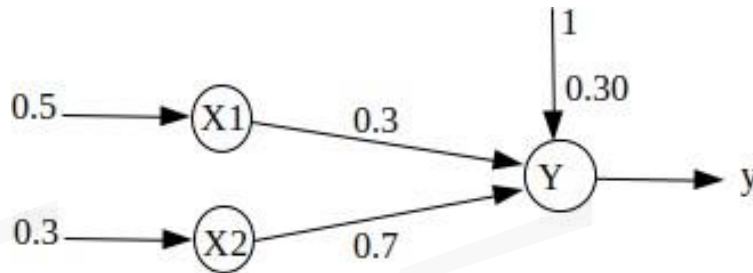
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|----|--|-----|
| 1 | With the help of an example, state the role of bias in determining the net output of an Artificial Neural Network. | (3) |
| 2 | Compare and contrast biological neuron and artificial neuron. | (3) |
| 3 | Draw the architecture of Adaline Network. What is the training rule for Adaline network? | (3) |
| 4 | Mention the applications of perceptron networks. | (3) |
| 5 | With the help of a figure, explain the features of fuzzy membership functions. | (3) |
| 6 | State the relevance of fuzzification. | (3) |
| 7 | Compare and contrast traditional algorithm and genetic algorithm. | (3) |
| 8 | Explain Stochastic Universal Sampling with an example. | (3) |
| 9 | Differentiate between linear and nonlinear Multi Objective Optimization Problem. | (3) |
| 10 | Explain the concept of Pareto optimality. | (3) |

PART B*Answer any one full question from each module, each carries 14 marks.***Module I**

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|----|--|-----|
| 11 | a) Draw the flowchart of Hebb training algorithm. | (5) |
| | b) Design a Hebb network to realize logical OR function. | (9) |

OR

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|----|--|-----|
| 12 | a) With the help of an example explain Supervised, Unsupervised, Reinforcement learning. How is the critic information used in learning process? | (9) |
| | b) Calculate the net input to the neuron Y for the network shown in figure. | (5) |



Module II

- 13 a) Draw the architecture and explain training algorithm of Back Propagation network. Write its testing algorithm. (10)
- b) State the testing algorithm used in perceptron networks. (4)

OR

- 14 a) Implement AND logical function using Perceptrons. (5)
- b) Use Adaline to train ANDNOT function with bipolar inputs and targets. Perform 2 epochs of training. (9)

Module III

- 15 a) Using inference method, find the membership values of the triangular shapes; isosceles (I), right angled (R), isosceles and right angled (IR), equilateral (E), and other triangles(T); for a triangle with angles 120° , 50° , 10° . (8)
- b) Consider the following two fuzzy sets: (6)

$$A = \left\{ \frac{0.2}{1} + \frac{0.3}{2} + \frac{0.4}{3} + \frac{0.5}{4} \right\}$$

$$B = \left\{ \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.2}{3} + \frac{1}{4} \right\}$$

Find the algebraic sum, algebraic product, bounded sum, and bounded difference for the given sets.

OR

- 16 a) Three fuzzy sets are defined as follows: (8)

$$A = \left\{ \frac{0.1}{30} + \frac{0.2}{60} + \frac{0.3}{90} + \frac{0.4}{120} \right\}$$

$$B = \left\{ \frac{1}{1} + \frac{0.2}{2} + \frac{0.5}{3} + \frac{0.7}{4} + \frac{0.3}{5} + \frac{0}{6} \right\}$$

$$C = \left\{ \frac{0.33}{100} + \frac{0.65}{200} + \frac{0.92}{300} + \frac{0.2}{400} \right\}$$

Find: (i) $R = A \times B$ (ii) $S = B \times C$

(iii) $T = RoS$, using Max-Min composition

(iv) $T = RoS$, using Max-Product composition.

- b) What is defuzzification? Explain any four defuzzification methods. (6)

Module IV

- 17 a) With the help of necessary block diagrams, compare Mamdani and Sugeno Fuzzy Inference Systems. (9)

- b) Differentiate between value encoding and permutation encoding. (5)

OR

- 18 a) With the help of examples, explain the various crossover techniques employed in genetic algorithms. (10)

- b) Mention the stopping condition for genetic algorithm flow. (4)

Module V

- 19 a) Explain convex and nonconvex MOOP. How to find a non dominated set? (10)

- b) What are the properties of dominance relation? (4)

OR

- 20 a) State the properties of Genetic Neuro Hybrid System. Draw the block diagram of Genetic Neuro Hybrid System. (5)

- b) Explain the characteristics and different classifications of a neuro-fuzzy hybrid system. (9)
