



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree (S, FE) Examination May 2024 (2015 Scheme)

Course Code: MR402**Course Name: Soft Computing Techniques**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 5 marks.*

Marks

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| 1 | Explain the concept of Fuzzy Sets, including their basic definition and terminology. Provide examples to illustrate your explanation. | (5) |
| 2 | Describe the Mamdani Fuzzy Model and its characteristics. How does it differ from other fuzzy models such as Sugeno and Tsukamoto. | (5) |
| 3 | Define Supervised Learning Neural Networks. Describe the structure and functioning of Perceptrons. How do Perceptrons learn and make decisions based on input data. | (5) |
| 4 | Explain Unsupervised Learning Neural Networks. Discuss the principles behind Competitive Learning Networks and their role in clustering and pattern recognition tasks. | (5) |
| 5 | Explain about the four-rule ANFIS equalizer. | (5) |
| 6 | Write applications for adaptive systems. | (5) |
| 7 | Compare the forward and inverse kinematics problems. | (5) |
| 8 | Explain how colour recipe prediction is proposed by applying Genetic Algorithms. | (5) |

PART B*Answer any three full questions, each carries 10 marks.*

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| 9 | a) Define Fuzzy Rules and Fuzzy Reasoning. | (3) |
| | b) How are fuzzy rules utilized in making decisions within a Fuzzy Logic system. | (4) |
| | c) Provide a hypothetical scenario to illustrate. | (3) |
| 10 | a) What are the different methods used in derivative based optimization | (6) |
| | b) Explain the terms: a) Step Size b) direction vector c) Θ | (4) |

- 11 a) Write a note on steps used in downhill simplex search (5)
- b) What are the various types of cross over and mutation techniques? (5)
- 12 a) Set up a Kohonen self-organizing network with 2 inputs and 49 output units and its training. (10)
- 13 a) What are the Crossover technique used in Genetic Algorithms and Explain with Examples? (10)
- 14 a) Explain Hebb rule with example? (5)
- b) What is the role of Hebb rule in neural network? (5)

PART C

Answer any two full questions, each carries 15 marks.

- 15 a) Discuss learning methods that cross-fertilize Adaptive Neuro-Fuzzy Inference Systems (ANFIS) and Radial Basis Function Networks (RBFN). (5)
- b) How do these methods leverage the strengths of both ANFIS and RBFN to enhance modeling and prediction capabilities? (5)
- c) Provide insights into their applications in real-world scenarios. (5)
- 16 a) Identify nonlinear rule for neuron functions in Adaptive networks. (7)
- b) Outline the architecture of color paint manufacturing intelligence. (8)
- 17 a) Describe the joint variables used in soft computing. (5)
- b) Elaborate about the Kinematic chain in forward and inverse kinematic problem. (5)
- c) Write a note on Denavit-Hartenberg convention in forward kinematic problem. (5)
