Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Regular and Supplementary Examination December 2022 (2019 Scheme)

Course Code: MRT 307

Course Name: SOFT COMPUTING TECHNIQUES

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

		Marks
1	What is meant by fuzzy set? Which are the operations on a fuzzy set?	3
2	Consider two fuzzy sets A and B $A = \{\frac{0.2}{1} + \frac{0.6}{2} + \frac{0.5}{3} + \frac{0.8}{4} + \frac{0.4}{5} + \frac{1}{6}\}$ $B = \{\frac{0.3}{1} + \frac{0.8}{2} + \frac{0.6}{3} + \frac{0.9}{4} + \frac{0.2}{5} + \frac{1}{6}\}$ Find: a) A U B b) $A \cap B$	3
3	Define gradient function. What are the stopping criteria used in gradient method?	3
4	What is Newton's method in derivative based optimization?	3
5	Explain the term: a) Encoding Schemes b) Fitness evaluation c) Selection	3
6	Explain learning algorithm used in ADALINE with flow chart	3
7	Define Extension of Moody Darken's RBFN	3
8	What are the conditions for equivalence of RBFN with FIS?	3
9	Mention different learning methods used in RBFN	3
10	What is the difference between forward and inverse kinematics problem	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	The formation of algal solutions in surface water is strongly dependent on P^H of water, temperature and oxygen content. T is a set of wter temperature from a lake given by T= {50, 55, 60} and O is oxygen content values in water given by	14

O= {1, 2, 6}. The fuzzy sets are given by,

$T = \{ \frac{0.8}{50} + \frac{0.7}{55} + \frac{0.9}{60} \}$ $O = \{ \frac{0.2}{1} + \frac{0.5}{2} + \frac{0.6}{6} \}$ and

$I = \{ \frac{0.5}{50} + \frac{1}{55} + \frac{0.7}{60} \}$

Find:

a) R=T x O

b) S= I x O

c) Q= R. S using Max product composition

12 a) State extension principle with an example 5

b) Define: 9

a) Gaussian Membership Function

b) Generalized Bell Membership Function

c) Sigmoid Membership Function

Module -2

13 Distinguish among different types of defuzzification schemes for obtaining a crisp output 14

14 Explain about Mamdani fuzzy inference system and Tsukamoto fuzzy inference system 14

Module -3

15 a) Write a note on steps used in downhill simplex search 7

b) Explain Back propogation multilayer perceptron 7

16 Using the genetic algorithm process, maximize the function f(x)= 5x+9 where x lies in the interval (0,25). Assume the necessary operators for the process on your own 14

Module -4

17 a) Explain unsupervised learning networks 10

b) Define Learning vector quantization 4

18 Explain Hebbian learning 14

Module -5

19 Explain the term hybrid learning algorithms 14

20 Explain in detail about the learning methods that cross fertilize ANFIS and RBFN methods 14

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