Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Regular and Supplementary Examination July 2021

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) Explain the terms Fuzzy Computing and Neural Computing. Mention some of the areas where you can apply them. (7)

b) Explain extension principle. Suppose f is a function mapping from U_1 = {-1,0,1} and U_2 = {-2, 2} to V = {-2, - 1, 0,1,2, 4, 6,9} and f (x_1, x_2) = $(x_1 + x_2)^2$. Let A_1 and A_2 be fuzzy sets defined on U_1 and U2 respectively such that A_1 =0.5/-1 + 0.1/0 + 0.9/1 and A_2 = 0.4/-2 + 1.0/2. Use Zadeh's Extension principle, derive B = f (A_1, A_2). (8)

2 a) Determine the inverse, domain, range, height and resolution form of the fuzzy relation given by (9)

$$R = \begin{bmatrix} 0.2 & 0.4 & 0.9 \\ 0.3 & 0.6 & 0.5 \\ 0.4 & 1 & 0.8 \end{bmatrix}$$

b) Prove the modular equality of fuzzy counting. (6)

3 a) Given fuzzy set $A = \left\{\frac{0.1}{2} + \frac{0.4}{3} + \frac{0.5}{4} + \frac{0.6}{5} + \frac{1}{7} + \frac{1}{8} + \frac{0.5}{9}\right\}$. Find the height and support of the fuzzy set. Is the fuzzy set normal? (5)

b) a) Consider the fuzzy set *A* described by: (10)

$$A = [\frac{0.2}{10} + \frac{0.4}{20} + \frac{0.8}{40} + \frac{0.5}{60} + \frac{0.6}{70} + \frac{0.1}{100}]$$

and the fuzzy set *B* defined by the membership function

$$B = [\frac{0.1}{10} + \frac{0.3}{30} + \frac{0.5}{40} + \frac{0.8}{60} + \frac{0.9}{100}]$$

Determine a) E(A, B) b) $|A \cap B|$ c) $(BUA)_{\alpha/\ \alpha = 0.5}$ d) $A \ominus B$ e) S(A,B)

PART B

Answer any two full questions, each carries 15 marks

4	a)	Explain fuzzy rule based system with the help of block diagram.	(9)
	b)	With proper examples, compare supervised and unsupervised learning.	(6)
5	a)	Implement XOR function using McCulloch-Pitts neuron (take binary data).	(7)
	b)	Explain the various defuzzification methods.	(8)
6	a)	Let X = {a, b, c, d} Y= {1,2,3,4} and A= {(a,0), (b,0.6), (c,0.8), (d,1)} B= {(1,0.2), (2,1), (3,0.8),}; C= {(1,0), (2,0.4), (3,1), (4,0.8)} Determine the implication relation 1. If X is A THEN Y is B else Y is C 2. If X is A THEN Y is B	(8)
	b)	Give the mathematical representation of an artificial neural network. Construct a feed-forward network with four input nodes, two hidden nodes and three output nodes.	(7)

PART C

Answer any two full questions, each carries 20 marks

7	a)	Explain various stopping conditions for genetic algorithm flow.	(10)
	b)	With a neat diagram, explain the back propagation algorithm for training MLP.	(10)
8	a)	Briefly explain the various encoding techniques used in genetic algorithm.	(10)
	b)	If the activation function of all hidden unit is linear, then show that MLP is equivalent to single layer perceptron.	(5)
	c)	Explain the concept of linear separability.	(5)
9	a)	Implement OR logical function with binary inputs & bipolar outputs using perceptron training algorithm.	(10)
	b)	Explain various selection strategy techniques in Genetic Algorithm.	(10)

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