Instructions:

Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY ME Semester –III Examination Dec. - 2011

Subject code: 730103 Subject Name: Soft Computing Time: 10.30 am – 01.00 pm

Date: 08/12/2011

Total Marks: 70

1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. (a) Explain various architectures of ANN in brief. What are learning 07 0.1 methods to train the ANN? (b) How GA differs from conventional algorithms? Explain each step of 07 solving any problem using GA. (a) What do you mean by hybrid systems? How they are classified? 07 **Q.2** Briefly explain any one hybrid system. (b) 1. What is the effect of following parameters on the working of 04 backpropagation network? (i) No. of hidden nodes (ii) Momentum coefficient (α) (iii) Sigmoidal gain (λ) (iv) Learning coefficient (η) 2. What is advantage of logarithm and exponent neuron? 03 OR (b) 1. Briefly explain model of an artificial neuron. 03 2. Explain simple perceptron and multilayer feedforward perceptron 04 model. What is limitation of perceptron? (a) Given patterns Q.3 07 A1=(000111001) B1=(010000111) A2=(110110101) B2=(101001010) A3=(111001110) B3=(10000001) Use bidirectional associative memory proposed by kosko to check whether (i) B2 is recalled from A2? (ii) B3 is recalled from A3? If yes then how? (b) Given two fuzzy sets *tall* and *medium* with universal set X as follows. $X = {Jay, Jasmin, Raj, Riya}$ $tall = \{(Jay, 0.2), (Jasmin, 0.5), (Raj, 0.7)\}$ $medium = \{(Jay, 0.8), (Jasmin, 0.8), (Riya, 0.9)\}$ (i) Find difference and disjunctive sum of *tall* and *medium*. (ii) Prove that $(tall \cup medium)' = tall ' \cap medium ' and$ 03 (tall U tall ') # X 04 OR

(a) 1. Explain fuzzy quantifiers and fuzzy inference. Q.3 03 2. Let the two universal sets are 04 temperature = $\{30, 40, 50, 60, 70, 80, 90, 100\}$ pressure = $\{5, 7, 9, 11, 15, 17\}$ fuzzy sets correspondence to temperature are $high = \{(50,0.7), (60,1), (70,1), (80,0.6), (90,0.3)\}$ *very high* = {(70,0.7), (80, 0.9), (90,1), (100,1)} and fuzzy sets correspondence to pressure are $medium = \{(5,0.3), (7,0.9), (9,0.8), (11,0.2)\}$ $low = \{(5,1), (7,0.6), (9,0.1)\}$ Find fuzzy relation for given two implications. (i) If temperature is *high* then pressure is *medium*. (ii) If temperature is *high* then pressure is *medium* else pressure is low. (b) Let three fuzzy sets X, Y, Z are as follows. 07 $X = \{(1,0), (2,0.45), (3,0.45), (4,0)\}$ $Y = \{(3,0), (4,0.8), (5,0.8), (6,0)\}$ $Z = \{(5,0), (6,1), (7,1), (8,0)\}$ Find defuzzified output of aggregated fuzzy sets X, Y, Z using centroid method. Q.4 (a) Explain various parent selection methods used in GA. 07 (b) Explain single point, two point, multi point and uniform cross over 07 with suitable example. Perform uniform cross over using mask on given pair of chromosomes. P1 = 1 0 1 0 0 0 1 1 1 0 1 P2 = 0 1 0 1 0 1 0 0 1 1 0 Mask = 10010111001.OR (a) 1. Differentiate exploration and exploitation. What is effect of cross 03 **O.4** over and mutation on them? 2. What is multi level and multi modal optimization? 04 (b) Suppose a 3-5-1 BPN has all 20 weights are randomly initialized. The 07 goal is to optimize the set of weights to reduce MSE. Show just steps how GA can be used to get optimized weights? (a) What do you mean by LR type fuzzy numbers? What are its 07 **Q.5** applications? Explain architecture of fuzzy backpropagation network. (b) Let the two universal sets temperature, pressure and four fuzzy sets 07 high, very high, medium, low are defined as in Q:3 (a) above. A FAM bank comprising of two rules: R1: If temperature is *high* then set pressure to *medium*. R2: If temperature is very high then set pressure to low. If given temperature is 85, draw aggregated fuzzy set correspondence to outputs of both rules R1 and R2. OR (a) Mention the situations when to use GA for application? What are Q.5 07 benefits of GA? (b) What are variations of standard back propagation algorithms? 07 *****

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