M.E. First Semester (Electronics & Tele.) (Full Time) (C.G.S. - New)
13337 : Elective - I : Artificial Intelligent System : 1 ENTC 5

P. Pages : 2

Time : Three Hours

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Max. Marks : 80

Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Illustrate your answer necessary with the help of neat sketches.
4. Assume fuzzy notations wherever necessary.
5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) Prove that the properties of symmetry, reflexivity and transitivity are preserved under inversion for both crisp and fuzzy relation. 7

   b) Solve the following fuzzy relation equation for the max min composition. 7

   $$P \circ \begin{bmatrix} 0.5 & 0 & 0.3 & 0 \\ 0.4 & 1 & 0.3 & 0 \\ 0 & 0.1 & 1 & 0.1 \\ 0.4 & 0.3 & 0.3 & 0.5 \end{bmatrix} = \begin{bmatrix} 0.5 & 0.3 & 0.3 & 0.1 \\ 0.5 & 0.4 & 0.4 & 0.2 \end{bmatrix}$$

OR

2. a) What is defuzzification? Explain different defuzzification methods. 7

   b) In the ordinary arithmetic real numbers, the equation $a = a + b - b$ holds for any number $a, b \in R$. Does this equation holds for fuzzy number? Justify your answer with two symmetric triangular fuzzy numbers $\underset{\sim}{A}$ & $\underset{\sim}{B}$. 7

3. a) Explain multicriteria decision making process. 7

   b) Explain the following fuzzy ranking methods. 6
      i) Hamming distance method ii) Extension principle based method

OR

4. a) Explain in brief unconditional and unqualified proposition in brief. 6

   b) Explain the canonical forms of fuzzy rule based system. What do you understand by aggregation of fuzzy rules? Explain two simple cases in determining an aggregation strategy. 7

5. a) Explain adaptive neuro fuzzy inference system (ANFIS). Draw its architecture. How the learning is enforced in ANFIS. 7

   b) Differentiate between conventional PI controller and fuzzy PI controller. 6

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6. a) Describe various steps in designing a simple fuzzy logic control system.   6

    b) Explain in brief following method of multifeatured pattern recognition using Fuzzy Logic.   7
        i)   Nearest Neighbour designer
        ii) Nearest Centre classifier

7. a) Implement two-input OR logic using. Single discrete perceptron.   7

    b) Derive perceptron convergence theorem.   6

OR

8. a) Discuss the significance of the following term:-   7
        i)   Learning Constant   ii) Momentum turna

    b) Derive an expression for a generalised delta rule for a feedforward neural network with a single hidden layer. http://www.sgbauonline.com   6

9. a) Draw the simplified architecture of ART network and explain how the network is trained.   7

    b) Given Kohonen SOM with weights as show in Fig. 9. (b) using the square of Euclidean distance to find the cluster unit C_j that is closed to the input vector $[0.5 \ 0.2]^t$.   7

        i)   Using learning rate of 0.2, find new weights for the unit C_j.

        ii) If units C_{j-1} and C_{j-1} are allowed to learn input pattern.

Fig. 9 (b)
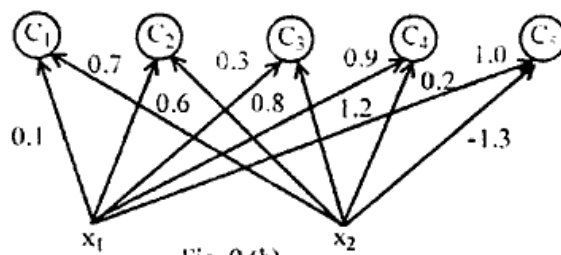
OR

10. a) Discuss the three essential processes involved in the formation of the SOM.   5

    b) Write the different steps involved in Kohonen SOM training.   5

    c) Enlist different application of counter propagation network.   4

11. a) Explain support vector machine as Kernel machine.   7

    b) Explain following types of encoding.   6
        i)   Permutation encoding   ii) Tree encoding

OR

12. a) Explain the role of fitness function in genetic algorithm with suitable example.   7

    b) Explain the working of electro-optical matrix multipliers.   6

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