M.E. Second Semester (Digital Electronics) (Part Time / Full Time) (C.G.S.- New)
13233 : Artificial Intelligent Systems : 2 UMEF 4

P. Pages : 2

Time : Three Hours

1063

AW - 3765

Max. Marks : 80

Notes : 1. Assume suitable data wherever necessary.
2. Illustrate your answer necessary with the help of neat sketches.
3. Use of pen Blue/Black ink/refill only for writing the answer book.

---

1. What is fuzzification? What is defuzzification. Explain the different methods of defuzzification with example. **14**

OR

2. a) The discretized membership function for a transistor & a resistor are given in the following equation. **7**

$$\mu_R = \left\{ \frac{0}{0} + \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.3}{3} + \frac{0.4}{4} + \frac{0.5}{5} \right\}$$

$$\mu_T = \left\{ \frac{0}{0} + \frac{0.3}{1} + \frac{0.7}{2} + \frac{0.75}{3} + \frac{0.85}{4} + \frac{1}{5} \right\}$$

Calculate the following.

   a) $\mu_R \vee \mu_T$ b) $\mu_T \wedge \mu_R$

   c) $\bar{\mu}_T$ d) $\bar{\mu}_R$

   e) De Morgans law $\overline{\mu_T \wedge \mu_R} = \bar{\mu}_T \vee \bar{\mu}_R$

b) Describe **7**

   i) Crisp set and crisp variables.

   ii) Fuzzy set and fuzzy variables with an example of each.
       Also discuss how fuzzy logic handles uncertainty & imprecision in information.

3. a) Explain aggregation of fuzzy rules using. **6**
   i) Conjunctive system of rules &   ii) Disjunctive system of rules

b) What are linguistic hedges. With suitable example explain. **7**
   i) Concentration   ii) Dealation &
   iii) Intensification

OR

4. A factory process control operation involves two linguistic parameters consisting of pressure & Temperature in a fluid delivery systems. National temperature limits are 130°F to 140°F. Nominal pressure limits range from 400 PSI minimum to 1000 PSI maximum. We characterize each parameter in fuzzy linguistic terms as follows. **13**

$$\text{"LOW" temp} = \left\{ \frac{1}{131} + \frac{.8}{132} + \frac{.6}{133} + \frac{.4}{134} + \frac{.2}{135} + \frac{0}{136} \right\}$$

$$\text{"LOW" Press} = \left\{ \frac{0}{1000} + \frac{0.2}{900} + \frac{.4}{800} + \frac{.6}{700} + \frac{.8}{600} + \frac{1}{400} \right\}$$

$$\text{"High" Temp} = \left\{ \frac{1}{139} + \frac{.8}{138} + \frac{.6}{137} + \frac{.4}{136} + \frac{.2}{135} + \frac{0}{134} \right\}$$

$$\text{"High" Press} = \left\{ \frac{0}{400} + \frac{.2}{600} + \frac{.4}{700} + \frac{.6}{800} + \frac{.8}{900} + \frac{1}{1000} \right\}$$

   a) Find the following membership functions.
     i) Temperature not very low.

AW - 3765

1

P.T.O

      ii)   Temperature not very high.

      iii) Temperature not very low and not very high.

  b)   Find the following membership functions.

      i)   Pressure slightly high.

      ii)   Pressure fairly high $\left([high]^{2.5}\right)$.

      iii) Pressure not very low or fairly low.

5.   a)   Discuss Neuro fuzzy control list its various properties. Discuss inverse learning with suitable block schematics.   **7**

     b)   Explain what is fuzzy pattern recognition also differentiate between pattern recognition & pattern classification.   **6**

OR

6.   Design a fuzzy PD controller for a DC series motor. Assume suitable data required.   **13**

7.   a)   Describe in brief, various activation functions used in ANN.   **6**

     b)   A training set for XOR problem is given below.   **8**

I/P		Derived O/P
0	0	0.01
0	1	0.99
1	0	0.99
1	1	0.01

    Prove that a strictly feed forward network with one node in the hidden layer cannot solve the XOR problem.

OR

8.   Explain EBPTA with block diagram of signal flow. Discuss various tuning parameters. Explain the terminality criterion for EBPTA. Draw the flow chart for this algorithm.   **14**

9.   a)   Discuss the major problems associated with Discrete Hopfield network as an associative memory.   **5**

     b)   What do you understand by self organizing feature map? State main conditions for the self organization of the Kohonen's feature map.   **8**

OR

10.   Explain in brief the architecture of a forward only Counter Propagation Network (CPN). Explain how weights between I/P layer & hidden layer of a CPN are trained using a simple competitive learning. Enumerate the application of CPN.   **13**

11.   a)   For genetic algorithm explain the following terms.   **7**
      i)   Fitness function.   ii)   Reproduction.
      iii) Crossover &   iv)   Mutation.

     b)   Explain how SVM can be used for classification.   **6**

OR

12.   Design a printed alphabets (A to Z) recognition system using neural network each alphabet is represented by 7×5 matrix of binary values zeros & ques.   **13**

****