Register Number: ……………………..

B.E., DEGREE EXAMINATIONS: NOV/DEC 2012

Seventh Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

EIE116: Applied Soft Computing

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Soft limiting activation functions exhibit ------------------- characteristics.

   a)   trapezoidal   b)   linear

   c)   sigmoidal   d)   inverse

2. ----------- nets control the degree of similarity of patterns placed on the same cluster.

   a)   Backpropagation   b)   Hopfield

   c)   Adaptive Resonance theory   d)   Kohonen

3. ----------- learning rule is independent of activation function of neurons.

   a)   perceptron   b)   delta

   c)   outstar   d)   Widrow-Hoff

4. A controller based on neural network whose output responds to input signals based on user defined control system parameters is called -------------

   a)   Probabilistic neurocontroller   b)   Parameterized neurocontroller

   c)   neocognitron   d)   Gaussian machine

5. Cardinality of fuzzy relation is

   a)   one   b)   zero

   c)   infinite   d)   finite

6. Region of universe containing elements that has complete and full membership is called ------- of a membership function

   a)   boundary   b)   support

   c)   core   d)   convex

7. Fuzzy decision are sometimes made on the basis of the rank is

   a)   Fuzzy synthetic evaluation   b)   Fuzzy ordering

   c)   Preference   d)   Consensus

8. - ----------- type of fuzzy inference is computationally efficient and works with optimization and adaptive techniques

a) mamdani b) Sugeno

c) zadeh d) kosko

9. ……. operation produces offspring by exchanging information between two parent chromosomes.

a) mutation b) crossover

c) inversion d) population

10. Parameters that can be tuned in fuzzy systems are

a) rules b) Membership function

c) Rule weights d) All the above

PART B (10 x 2 = 20 Marks)

11. Distinguish between supervised and unsupervised learning.

12. What is kohonen self organizing maps?

13. What is system identification?

14. List any two applications of neural networks.

15. How is a fuzzy set different from a crisp set?

16. Define alpha cut of a fuzzy set.

17. List the various types of membership function

18. What is fuzzy tolerance relation?

19. Define mutation.

20. What is neuro fuzzy controller?

PART C (5 x 14 = 70 Marks)

21. a) (i) Discuss back propagation training algorithm with a relevant diagram (8)

    (ii) Perform two training steps of a neural network with 3 inputs using the delta (6) learning rule for $\chi=1$ and $c=0.25$. Train the network using the following data pairs

$$X_1 = \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix}, d_1 = -1, X_2 = \begin{bmatrix} 1 \\ -2 \\ -1 \end{bmatrix}, d_2 = 1$$

Assume bipolar continuous activation function with initial weight vector $W^1 = [\ 1\ 0\ 1\ ]$

(OR)

b) (i) Describe the architecture of ART1. (7)

    (ii) Bring out an algorithm to train the ART1 network. (7)

22. a) With a neat diagram discuss how artificial neural network can be used for process identification with respect to feedfarward and plant inverse identification.

(OR)

b) Write short notes on

    (i) Parameterized neurocontroller (7)

    (ii) Learning control systems (7)

23. a) Explain

(i) Aggregation of rules (5)

(ii) Canonical form of rules (4)

(iii) Decomposition of rules (5)

(OR)

b) (i) What is fuzzy relation? Discuss the properties of fuzzy relation. (8)

   (ii) Two fuzzy sets $A= \left\{\dfrac{1}{1.0}+\dfrac{0.75}{1.5}+\dfrac{0.3}{2.0}+\dfrac{0.15}{2.5}+\dfrac{0}{3.0}\right\}$, $B=\left\{\dfrac{1}{1.0}+\dfrac{0.6}{1.5}+\dfrac{0.2}{2.0}+\dfrac{0.1}{2.5}+\dfrac{0}{3.0}\right\}$. Find complement, Union , Intersection and Difference. (6)

24. a) What is the need for defuzzification? Explain the different methods of defuzzification.

(OR)

b) (i) With a neat diagram, discuss the steps involved in the design of FLC. (7)

   (ii) Discuss in detail the concept of adaptive fuzzy system. (7)

25. a) Explain the working of genetic algorithm with respect to optimization of membership function and rule base.

(OR)

b) Explain how the role of ANN in the design of Neuro - fuzzy systems.

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