Register No: ……

B.E DEGREE EXAMINATIONS: APRIL/MAY 2011

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI604: Neural Network & Fuzzy Logic Control

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

Answer ALL Questions

PART A (10 x 1 = 10 Marks)

1. The signal transmission across a synaptic gap by means of the following process.

   a. Electric process b. Hydraulic process c. Chemical process d. Electronic process

2. Which gate exhibits non-linear separability?

   a. NOR b.XOR c. XNOR d. NAND

3. An example of a feedback network is

   a. BPN b. Hopfield c. Perceptron d. McCulloch Pitts

4. Which one follows competitive learning?

   a. Winner take all b. Delta c. Perceptron d. Hebb

5. Cardinality of fuzzy set is

   a. Zero b. Infinite c. Finite d. Negative

6. Which one is the method of fuzzification?

   a. Centre of Area b. Centre of gravity c. First of Maximum d. Intuition

7. How many parameters determine the Gaussian membership function?

   a. 2 b. 3 c. 1 d. 4

8. Adaptive fuzzy control prefers

   a. modification in MF b. modification in weights

   c. modification in rules d. All

9. The decision making unit of FLC is

   a. CPU b. Knowledge base c. Inference Engine d. Search Engine

10. TSK model is

    a. Neural model b. Fuzzy model c. Adaptive fuzzy model d. Neuro-Fuzzy

PART B (10 x 2 = 20 Marks)

11. List out the major components of biological neural network and an ANN.

12. Differentiate between supervised learning and un-supervised learning.

13. Give the significant difference between feed-forward and feedback neural networks.
14. Write the expression for energy function of a discrete Hopfield network.
15. Write the intersection and NOT functions of two fuzzy sets A and B.
16. What are the methods of aggregation of fuzzy rules?
17. Define: Crossover function.
18. What is the importance of an adaptive fuzzy system?
19. What are the design constraints of FLC?
20. State the important features of a Neuro-Fuzzy Controller.

PART C (5 x 14 = 70 Marks)

21. a) (i) Draw the biological neuron and how it can be modeled by Artificial neural network? (7)

(ii) Explain about Delta Learning Rule. (7)

(OR)

b) Draw the architecture of Back propagation network and explain about weight updation in its different layers.

22. a) Draw the architecture of Discrete Hopfield Neural network and Explain.

(OR)

b) (i) How does Neural Network help in process identification? (7)

(ii) Explain about Neuro control architecture in brief. (7)

23. a) For the given two fuzzy sets

$$X = \frac{1}{a} + \frac{0.75}{b} + \frac{0.3}{c} + \frac{0.15}{d} + \frac{0}{e}$$

$$Y = \frac{1}{a} + \frac{0.6}{b} + \frac{0.2}{c} + \frac{0.1}{d} + \frac{0}{e}$$

Perform the following fuzzy operations.

(i) $X \cup Y$ (ii) $X \cap Y$ (iii) $\overline{X}$ (iv) $\overline{Y}$ (v) X / Y (vi) $\overline{X \cup Y}$ (vii) $\overline{X \cap Y}$

(OR)

b) What is defuzzification? What are the different methods? Explain any four methods.

24. a) With a neat sketch of FLC, explain the functioning of each block available in FLC.

(OR)

b) (i) Draw the fuzzy system which provides the adaptive control and explain. (7)

(ii) Explain Genetic algorithm in detail. (7)

25. a) What is inverted pendulum problem and explain the design steps to be followed for its control with FLC.

(OR)

b) Explain the design steps of FLC based home heating system.

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