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M. Tech 3rd Semester Examination

Neural Network & Fuzzy Logic

EC-311

Time : 3 Hours

Max. Marks : 100

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Attempt any FIVE questions. All questions carry equal marks.

1. (a) How is a multilayer neural network designed to implement half adder? Explain how the designed neural network is trained. Show the training process also. (10)
- (b) Differentiate between biological brain and artificial neural network. (10)
2. (a) Explain how basic Hopfield networks can be implemented for A-to-D converter. (10)
- (b) Describe the competitive process of the Self-Organizing Map algorithm with suitable example. (10)
3. Describe the following learning methods:
  - (a) Hebbian learning
  - (b) Instar
  - (c) Unsupervised learning
  - (d) Competitive learning (20)
4. (a) Design a BPN to recognize even and odd numbers between 0 to 9. Explain your design also. (10)

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- (b) Give the architecture of ART networks and describe the working principle of it. **(10)**

5. Describe the application of neural networks in the following:

- (a) Function approximation  
 (b) Blind source separation **(20)**

6. (a) A fuzzy set S for a power boiler pressure P (bar) with the membership function is given below:

$$S(P) = \begin{cases} 0.04(P - 200) & \text{if } 200 < P \leq 225 \\ -0.04(P - 200) & \text{if } 225 < P \leq 250 \\ 0 & \text{otherwise} \end{cases}$$

Sketch the graph of this membership function, and comment on its type. Also give the linguistic description for the concept conveyed by S. **(10)**

- (b) Describe various operations that can be performed on fuzzy sets. **(10)**

7. (a) What do you understand by fuzzy inference system? Discuss the need of fuzzy inference engine in fuzzy model with examples. **(10)**

- (b) With a supervised learning algorithm, we can specify target output values, but we may never get close to those targets at the end of learning. Give two reasons why this might happen. **(10)**

8. Write short notes on the followings:

- (a) ABS system with fuzzy logic concept  
 (b) Dendrites  
 (c) Learning rate coefficient  
 (d) Activation functions **(20)**