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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)**

(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:

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

   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)**