

B.E. (EE) Part – IV 7th Semester Examination, 2011-12

Subject: Soft Computing Techniques in Electrical Engineering

Paper / Code No: EE – 706/1

Branch: Electrical Engineering

Time: 2 Hrs.

Full Marks: 35

- i) Use separate Answerscript for each half.*
- ii) The questions are of equal value.*
- iii) Answer FOUR questions, taking TWO from each half.*
- iv) ½ mark is reserved for neatness in each half.*

FIRST HALF

1.a) What do you mean by the term ‘Fuzzy Entropy’ ? [2]

b) Two sets are given below:

$$A = (0.5, 0.8, 0.7, 1, 0.5), \quad B = (0, 0.9, 0.7, 0.6, 0.2)$$

In which set “fuzziness” is more and why? [2]

(c) Prove the fuzzy De Morgan law: [4 ½]

$$A \cap B = (A^c \cup B^c)^c$$

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2. Consider the design of a fuzzy controller for an antilock braking-system. There are two input spaces - Speed (N) and Temp (T) both equal [-10 to +10], and one output space - Brake Position (Z) equals [-100 to +100]. Assuming five uniform triangular membership functions -- negative large (NL), negative small (NS), zero (ZE), positive small (PS) and positive large (PL) on N, T, Z. Determine output Z, when N = 1 and T = -2. Assume center of largest area method of defuzzification strategies. Fuzzy rules are as follows: [8 ½]

	NL	NS	ZE	PS	PL
NL	-	-	PL	-	-
NS	-	-	PS	ZE	-
ZE	PL	PS	ZE	NS	NL
PS	-	ZE	NS	-	-
PL	-	-	NL	-	-

3. Write short notes on any two of the following: [4 ¼ × 2]

- a) Applications of ANN.
- b) Relevance of ‘Soft Computing’ in Electrical Engineering.
- c) Back propagation training algorithm

SECOND HALF

4. a) What are the differences in the architecture of 'Conventional Neural Networks' and a 'Competitive Learning Neural Network'.
- b) Describe with the help of suitable diagram a scheme to update the weight vectors associated with the winner neuron in a 'Competitive Learning Neural Network'. [3+5^{1/2}]
5. a) What is 'Self-organizing Map (SOM)'? Discuss the similarities between SOM and Biological Maps?
- b) Define the 'Neighbourhood Function' in the 'Kohonen's SOM' and discuss its significance in self-organization of the Maps. [3+5^{1/2}]
6. a) Define with examples, the 'Objective function' and 'Constraints' in an optimization problem.
- b) What is 'Financial Forecasting'? Draw a flow chart showing the steps to be followed to develop an ANN based forecasting model. [3+5^{1/2}]