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Question Paper Code: 92053

M.E. DEGREE EXAMINATION, OCTOBER - 2014.

Elective

Power Electronics and Drives

01PPE517 – SOFT COMPUTING TECHNIQUES

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Write the expression for binary and bipolar sigmoid activation functions.
2. Sketch the structure of Mc Culloh Pitts neuron model.
3. State the advantages of back propogation network
4. List the various types of neural networks.
5. Differentiate fuzzy set and crisp set.
6. Write the fuzzy set operations.
7. Define the term 'Elitism'.
8. Define two point crossover.
9. List the commonly used fuzzy AND operator.
10. List the applications of fuzzy logic to power electronics.

PART - B (5 x 14 = 70 Marks)

11. (a) Summarize the characteristics of soft computing techniques and list its properties. (14)

Or

- (b) Implement a back propagation neural network for a 2 input 1 output OR gate. Realize it for one step iteration for one input pattern and assume weight values of your own with a learning rate of 0.2. (14)

12. (a) Discuss in detail about Hopfield network. (14)

Or

- (b) Explain in detail about the implementation and training of associative memory in neural networks. (14)

13. (a) Three variables of interest in power transistor are the current, voltage and cost. The following memberships were developed from a hypothetical component catalogue.

$$\text{Average current, } I = \left\{ \frac{0.3}{0.8} + \frac{0.6}{0.9} + \frac{1.0}{1.0} + \frac{0.7}{1.1} + \frac{0.5}{1.2} \right\}$$

$$\text{Average voltage, } V = \left\{ \frac{0.3}{30} + \frac{0.7}{45} + \frac{1.0}{60} + \frac{0.8}{75} + \frac{0.6}{90} \right\}$$

$$\text{Cost, } C = \left\{ \frac{0.3}{0.5} + \frac{1.0}{0.6} + \frac{0.6}{0.7} \right\}$$

- (i) Compute the fuzzy Cartesian product $P = V \times I$
(ii) Compute the fuzzy Cartesian product $T = I \times C$
(iii) Using max-min composition, Compute $E = P \circ T$

Using max-product composition, Compute $E = P \circ T$. (14)

Or

- (b) With suitable diagrams and relations explain fuzzy reasoning for single rule with single antecedent and for single rule with multiple antecedents. (14)

14. (a) For the objective function, $E = x^2 + 3$ with constraint x is between 0 to 45, compute the one step iteration process using Genetic Algorithm. Make the necessary assumptions. (14)

Or

(b) Explain in detail the various steps involved in generic algorithm with a flow chart. (14)

15. (a) With a neat sketch explain the speed control of DC motor drive using fuzzy based controller. (14)

Or

(b) Explain the GA application to power system optimization problems. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Use Adaline network to train AND, NOT function with bipolar inputs and targets. Perform 2 epochs of training. (10)

Or

(b) Describe the architecture of a multilayer feed forward neural network. (10)

