

M.E. Second Semester (Electrical & Elect.) (New-CGS)
13290 : Neuro Fuzzy Control : 2 EEEME 3

P. Pages : 2

Time : Three Hours



AW - 3843

Max. Marks : 80

- Notes :
1. Due credit will be given to neatness and adequate dimensions.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answer necessary with the help of neat sketches.

SECTION - A

1. a) Prove that the De Morgan's law $\overline{(A \cup B)} = \bar{A} \cap \bar{B}$ is true for fuzzy sets A and B using Zadeh's operator for union, intersection and complement. 7
b) Explain the term Linguistic variable. Differentiate between Linguistic variable and Linguistic terms. 6

OR

2. a) Compute the cylindrical extension of fuzzy set $A = \{0.3/x_1 ; 0.4/x_2\}$ into the cartesian product domain $\{x_1, x_2\} \times \{y_1, y_2\}$. 7
b) Explain in details "Fuzzy Partition" ? 6
3. a) Discuss the design of an Automobile Cruise control system using fuzzy approach. 7
b) Explain design of fuzzy controller to control dynamics of a DC servo-motor also compare with classical controller design. 7

OR

4. a) Discuss motion of stability of fuzzy control system. How it is determined ? 7
b) Explain Takagi - Sugeno - Kang [TSK] architecture for fuzzy controller. 7
5. a) Explain back propagation learning algorithm in detail. 6
b) Derive the back propagation rule for output neuron with a sigmoidal activation function. 7

OR

6. a) Explain why delta rule is not used for training multi layer neural network. 6
b) Explain how feed forward neural network used for the control. 7
Also assume input layer contains situational and goal variables and output layer contains action variables.

SECTION - B

7. a) Develop optimal neural network model for controlling temperature. 7
b) How do you simulate a P.I. control with a neural network ? 7

OR

8. a) Explain applications of neural network design in direct neural control. 7
b) $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -5 & -2 & -3 \end{bmatrix}$ & $B = \begin{bmatrix} 0 \\ 0 \\ 9 \end{bmatrix}$ 7
compute U based on inverse dynamics.
9. a) Explain the term ANFIS in detail. 6
b) Explain basic principles & applications of fuzzy neural system. 7

OR

10. a) Describe Hybrid neural set (network) 6
Illustrate :
i) AND Fuzzy neuron
ii) OR Fuzzy neuron
b) Describe hybrid neural network hence define basic principles of fuzzy neural system. 7
11. Design a neuro fuzzy control system for Integrated Pest Management. 13

OR

12. Discuss fuzzy logic based control scheme for thermo-electric cooling of laser material. 13
