30/11/2024 CSE-AIML SEM-VII C SCHEME NNFS QP CODE: 10068461

Duration: 3 Hours **Max Marks: 80**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any THREE questions out of the remaining FIVE.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q1 Attempt any **FOUR**.

A. What are fuzzy quantifiers? Explain types of fuzzy quantifiers with an example. [5]

B. Compare Boltzmann Machine and Gaussian Machine. [5]

C. Give classification of Neuro-Fuzzy systems. List all the characteristics of Neuro-Fuzzy systems? [5]

D. Give comparison between Mamdani and Sugeno FIS. [5]

E. If A1 = {(x1, 0.9), (x2, 0.5), (x3, 0.2), (x4, 0.3)} [5]

Apply lambda-cut at 0.6 and 0.2 for the given fussy set.

Q2 A. What is the membership function in a fuzzy set? Explain properties of membership function. [10]

B. What is a Kohonen Self-Organizing Map? Explain its Architecture. [10]

Q3 A. Draw ANFS Architecture? Explain ANFIS as a Universal Approximator? [10]

B. Find max-min composition and max-product composition between the fuzzy relations for two given fuzzy relations: [10]

$$R = \begin{matrix} \\ y_1 \\ y_2 \end{matrix}\begin{matrix} \begin{matrix} y_1 & y_2 \end{matrix} \\ \begin{bmatrix} 0.6 & 0.3 \\ 0.4 & 0.9 \end{bmatrix} \end{matrix} \quad \text{and} \quad S = \begin{matrix} \\ z_1 \\ z_2 \\ z_3 \end{matrix}\begin{matrix} \begin{matrix} z_1 & z_2 & z_3 \end{matrix} \\ \begin{bmatrix} 1 & 0.5 & 0.5 \\ 0.8 & 0.4 & 0.7 \end{bmatrix} \end{matrix}$$

Q4 A. List and explain steps for Fuzzy Logic Control (FLC) designed with Mamdani and Takagi-Sugeno inference approach. [10]

B. Discuss the Bidirectional Associative Memory (BAM) architecture in detail. [10]

Q5 A. Discuss Hamming Network? Give its applications. [10]

B. What is Adaptive Resonance Theory 2. Discuss its Architecture and Training algorithm? [10]

Q6 Attempt All.

A. Advantages and disadvantages of fuzzy logic control. [5]

B. Ensemble neural model [5]

C. Fuzzy Reasoning [5]

D. Radial basis function network [5]