BE - VII - R2012/CBSGS - EXTC - EI - NNFL - 21/12/16 - 11-2

**QP Code :789101**

(3 Hours) Total Marks: 80

N.B. : (1) Questions No.1 is **compulsory.**
(2) Solve any three questions out of remaining **five** questions
(3) Draw neat labeled diagram whenever necessary
(4) Assume suitable data if necessary

Q1: Solve any five out of six (5x4)

a) Define epoch, iteration, error surface, and error function with reference to neural networks

b) Draw and explain neural networks based AND function.

c) What are the advantages of fuzzy logic over the crisp logic?

d) Explain with block diagram the supervised neural networks.

e) Draw and explain Radial Basis Function neuron with its mathematical interpretation.

f) Differentiate biological neural network and artificial neural network

Q.2 A) Draw the architecture of a Multilayer perceptron (MLP) and explain its operation. Mention its advantages and disadvantages. (10)

Q.2 B) i) Hopfield network made up of five neurons, which is required to store the following patterns:

$P1 = [1 \quad 1 \quad 1 \quad 1 \quad 1]^T$

$P2 = [1 \quad -1 \quad -1 \quad 1 \quad -1]^T$

$P3 = [-1 \quad 1 \quad -1 \quad 1 \quad 1]^T$

Evaluate the 5-by 5 weight matrix of the Hopfield Network (6)

ii) For the two fuzzy sets: (4)

Consider two fuzzy sets given by:

$$\underset{\sim}{A} = \left\{\frac{0.5}{2} + \frac{0.1}{3} + \frac{0.6}{4}\right\}$$



**[Turn Over**

$$\underset{\sim}{B} = \left\{\frac{0.7}{2} + \frac{0.2}{3} + \frac{0.4}{4}\right\}$$

Find i) A U B ii) A ∩ B iii) $\overline{A}$ iv) $\overline{A}$ U B of the fuzzy sets

Q.3A) i) What is fuzzy membership function? Hence define Support, Core, and Boundary of a membership function (5)

ii) For the Fuzzy relation R find the λ- Cut relation when λ = 0, 0.1, 0.7 and 1.0: (5)

$$R = \begin{bmatrix} 1.0 & 0.1 & 0.2 & 0.1 & 0.4 \\ 0.6 & 0.7 & 0.3 & 0.5 & 0.0 \\ 0.8 & 0.9 & 0.6 & 0.3 & 0.2 \\ 0.1 & 0.1 & 1.0 & 0.9 & 0.7 \end{bmatrix}$$

Q.3 B) Draw and explain the McCulloch-Pitts neuron architecture. Generate the output of Exclusive-OR logic function using McCulloch-Pitts neuron. (10)

Q.4 A) Draw Hopfield Neural Network with four output nodes. Also explain training and testing algorithm of Hopfield neural network. (10)

Q.4 B) Explain with diagrams any four methods for defuzzification in details. (10)

Q.5. A) Explain with block diagram the application of Neural Network for face recognition. (10)

Q.5.B) i) Write any four properties of fuzzy sets. (4)

ii) Develop graphically membership function to describe the linguistic variables (6)

"cold", "warm" and' Hot". The temp. range is 0 to 100 degrees. Use trapezoidal

and triangular shaped membership functions.

Q.6. A) Give any one application of Fuzzy logic in image processing. (6)

Q.6. B) i) Explain Fuzzy Control System with a block diagram and its application in fuzzy

control of washing machine. (8)

ii) Describe image compression using Neural Networks. (5)

---