



CBCS SCHEME

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15EE661

Sixth Semester B.E. Degree Examination, July/August 2021 Artificial Neural Networks and Fuzzy Logic

Time: 3 hrs.

Max. Marks:80

Note: Answer any FIVE full questions.

- 1 a. Explain the structure and functionality of the human brain, and its fundamental constituent biological neuron. (08 Marks)
b. Illustrate the model of an artificial neuron and the activation functions used. (08 Marks)
- 2 a. Demonstrate the problem of non-linearly separable patterns(XOR problem) associated with perceptron model. How the MADALINE used to overcome it. (08 Marks)
b. Write in detail the steps of back propagation learning algorithm. (08 Marks)
- 3 a. What are the tuning parameters of a Back Propagation Neural(BPN) networks? Explain how do they effect the error rate of the network. (10 Marks)
b. A Kosko's bidirectional associative memory is given with three pattern pairs(N = 3) as given below. Apply the heterocorrelation functions for any one of the pattern pairs and verify.
 $A_1 = (100001), B_1 = (11000)$
 $A_2 = (011000), B_2 = (10100)$
 $A_3 = (001011), B_3 = (01110).$ (06 Marks)
- 4 a. Summarize the augmented Back Propagation Networks (BPN), with it architecture and transfer functions. (08 Marks)
b. Explain about autocorrelators and heterocorrelators. (08 Marks)
- 5 a. Discuss about the networks architecture of ART2 neural network. (08 Marks)
b. What is vector quantization? Explain with an example. (08 Marks)
- 6 a. Write short notes no stability and plasticity dilemma referring to ART networks. (04 Marks)
b. Explain the steps of ART1 neural networks algorithm. (08 Marks)
c. Explain how ART1 network is used for English character recognition. (04 Marks)
- 7 a. What are fuzzy sets and their membership functions? (05 Marks)
b. Write the properties fuzzy sets. (05 Marks)
c. Given two fuzzy sets \tilde{I} and \tilde{F} to represent the identification of characters I and F
 $\tilde{I} = \{(F, 0.4), (E, 0.3), (X, 0.1), (Y, 0.1), (I, 0.9), (T, 0.8)\}$
 $\tilde{F} = \{(F, 0.99), (E, 0.8), (X, 0.1), (Y, 0.2), (I, 0.5), (T, 0.5)\}$
Find : i) $\tilde{I} \cup \tilde{F}$ ii) $\tilde{I} - \tilde{F}$ iii) $\tilde{F} \cup \tilde{F}^c$ iv) verify De Morgan's Law $(\tilde{I} \cup \tilde{F})^c = \tilde{I}^c \cap \tilde{F}^c$. (06 Marks)
- 8 a. What are crisp sets? Explain different operations on crisp sets. (08 Marks)
b. What are fuzzy relations? Explain the operations of fuzzy relations. (08 Marks)
- 9 a. Explain what do you understand by crisp logic. (05 Marks)
b. Is crisp set $(P \Rightarrow Q) \wedge (Q \Rightarrow P) = (P = Q)$ a tautology? (05 Marks)
c. How Type 2 fuzzy sets are represented? (06 Marks)
- 10 a. Explain the Defuzzification methods. (10 Marks)
b. Describe the union operation on Type 2 fuzzy sets. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.