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BENGALURU
School of Computer Science and Engineering
Mid - Term Examinations - November 2024

Semester: V

Date: 04-11-2024

Course Code: CSE3016

Time: 09.30am to 11.00am

Course Name: Neural Network and Fuzzy Logic

Max Marks: 50

Program: B.TECH (CSG)

Weightage: 25%

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

5Qx2M=10M

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|----------|--|---------|----|-----|
| 1 | Tell any four non-linear activation function. | 2 Marks | L1 | CO1 |
| 2 | Draw single layer recurrent neural network. | 2 Marks | L1 | CO1 |
| 3 | Define Hebb's law. | 2 Marks | L1 | CO1 |
| 4 | What are the limitations of multi-layer perceptron compare to single perceptron? | 2 Marks | L1 | CO2 |
| 5 | State competitive learning. | 2 Marks | L1 | CO2 |

Part B

Answer ALL Questions. Each question carries 10 marks.

4QX10M=40M

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|----------|--|----------|----|-----|
| 6 | Consider a neural network having two layers namely input and output. The input layer contains two inputs nodes and bias. The output layer holds one output unit. It also contains two normal weights. Construct a neural network model to calculate $y=x_1'x_2'$ logic using delta rule. | 10 Marks | L3 | CO1 |
|----------|--|----------|----|-----|

Or

- | | | | | |
|----------|--|---------|----|-----|
| 7 | a. Consider a neural network having two layers namely input and output. The input layer contains two inputs nodes. The output layer holds one output unit. It also contains two normal weights. | 6 Marks | L3 | CO1 |
|----------|--|---------|----|-----|

Construct a neural network model to compute $y = x_1'x_2$ logic using McCulloch and Pitts model.

b. Explain in detail about least mean square rule. 4 Marks L2 C01

8 Consider a neural network having two layers namely input and output. The input layer contains two inputs nodes and one bias node. The output layer holds one output unit. It also contains two normal weights. Construct a neural network model to compute $y = x_1 + x_2'$ logic using perceptron rule. 10 Marks L3 C01

or

9 a. Distinguish between ANN and BNN. 4 Marks L2 C01

b. Prove that differentiation of $\tanh(x) = 1 - \tanh^2(x)$ 6 Marks L3 C01

10 Validate that $\Delta W_{ji} = \eta \delta_j o_i$ with respect to hidden layer and $\Delta W_{kj} = \eta \delta_k o_j$ with respect to output layer using back-propagation algorithm. 10 Marks L3 C02

or

11 Consider a multi-layer perceptron which contains three layers namely input, hidden and output. The input layer contains two nodes and bias node. The hidden layer also contains two nodes and bias node. The output layer contains one node. The activation function used in hidden and output layers are binary step activation function. Build a model to compute a logic $y = x_1^2 - x_2^2 + 1$ using above scenario. 10 Marks L3 C02

12 Consider a radial basis neural network which contains three layers namely input, hidden and output. The input layer contains two nodes. The hidden layer also contains four nodes. The output layer contains one node. The activation function used in hidden and output layers are gaussian activation function. Develop a model to compute a logic AND using above scenario. 10 Marks L3 C02

or

13 a. Compare competitive learning with perceptron learning. 4 Marks L2 C02

b. Consider a Kohonen neural network having two layers namely input and output. The input layer contains three inputs nodes. The 6 Marks L3 C02

output layer holds two output unit. It also contains six normal weights namely $W_{11}=0.6$, $W_{12}=0.5$, $W_{13}=0.1$, $W_{21}=0.8$, $W_{22}=0.4$, and $W_{23}=0.7$. How clustering is molded using Kohonen self-organizing model. When $X_1=[1, 1, 0]$, $X_2=[1, 0, 0]$, $X_3=[1, 1, 1]$, $X_4=[0, 1, 1]$, $X_5=[1, 0, 1]$, $\eta=0.4$.