Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 10- 12- 2025 **Time:** 1.00pm to 04.00pm

School: SOCSE	**Program:** B.Tech	
Course Code: CAI2512	**Course Name:** Neural Networks and Fuzzy Logic	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**24**	**26**	**24**	

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. **10Q x 2M=20M**

1.	List out the differences between hard computing and soft computing.	**2 Marks**	**L1**	**CO1**
2.	Recite the need of activation functions are required in neural networks.	**2 Marks**	**L1**	**CO1**
3.	Outline the schematic representation of single layer perceptron with 5 input, 2 hidden layers and 3 output nodes.	**2 Marks**	**L1**	**CO1**
4.	List out the limitations of rosenblatt's perceptron.	**2 Marks**	**L1**	**CO2**
5.	State the applications of radial basis function networks.	**2 Marks**	**L1**	**CO2**
6.	Define fuzzy set with an example.	**2 Marks**	**L1**	**CO3**
7.	Name the different types of fuzzy set?	**2 Marks**	**L1**	**CO3**
8.	State the formula to find compliment of a fuzzy set and find the same for the following: M(x)={(x1,0.9),(x2,0.6), (x3,0.2), (x1,0.7)}	**2 Marks**	**L1**	**CO3**
9.	List down the different types of fuzzy propositions.	**2 Marks**	**L1**	**CO4**
10.	Define fuzzy quantifiers with an example.	**2 Marks**	**L1**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Summarize various nonlinear activation functions in neural networks.	**10 Marks**	**L2**	**CO1**
	b.	Illustrate the algorithmic steps of single layer perceptron rule. and apply the same rule to realize the OR gate for bipolar inputs and targets. Assume learning rate to be 1.	**10 Marks**	**L3**	**CO1**
Or					
12.	**a.**	Demonstrate the different types of interconnections in neural network models.	**10 Marks**	**L3**	**CO1**
	b.	Explain the algorithmic steps of hebb's rule. Also, apply the same to realize the OR gate for bipolar inputs and targets.	**10 Marks**	**L3**	**CO1**

13.	**a.**	Describe the Multi-Layer Perceptron architecture in detail.	**10 Marks**	**L2**	**CO2**
	b.	Solve for ΔWji when neuron 'j' is an output in neural network using backpropagation algorithm.	**10 Marks**	**L3**	**CO2**
Or					
14.	**a.**	Explain the approach of Kohonen-SOM architecture with the help of diagram and algorithm.	**10 Marks**	**L2**	**CO2**
	b.	Assume that the neural network architecture using Radial basis function of the XOR input pattern. Cluster the first training sample to one of the output units. Let r to be 1.314. Following training data and weight matrix is given to you: which has two layers namely input and output. The input layer contains four nodes namely X1, X2 and output layer contains two nodes namely Y1 and Y2. The weights between input to output layers are W1, W2, W3, W4 and their values as -0.7, 0.6, 0.6 and -0.7 respectively. Employ RBFNN using above scenario.	**10 Marks**	**L3**	**CO2**

15.	**a.**	Describe the various membership functions of Fuzzy set.	**10 Marks**	**L2**	**CO3**
	b.	Let A and B be two fuzzy relations expressed in the matrix form, Find Cartesian product and C, the composition of two fuzzy relations. Also solve for the max-product composition for the same.	**10 Marks**	**L3**	**CO3**

		$A=\begin{bmatrix} 0.1 & 0.3 & 0.2 \\ 0.5 & 0.6 & 0.8 \\ 0.7 & 0.9 & 0.1 \end{bmatrix}$ $B=\begin{bmatrix} 0.4 & 0.2 & 0.7 \\ 0.2 & 0.1 & 0.5 \\ 0.8 & 0.6 & 0.9 \end{bmatrix}$			
		Or			
16.	**a.**	Explain the various properties of Crisp set in detail.	**10 Marks**	**L2**	**CO3**
	b.	Solve i) A(x)={(x1,0.1),(x2,0.3),(x3,0.4),(x4,0.5)} to measure of Fuzziness of Fuzzy set. ii) Measure Inaccuracy of Fuzzy set B with respect to A. Given A(x)={(x1,0.1),(x2,0.2),(x3,0.3),(x4,0.4)} and B(x)={(x1,0.5),(x2,0.7),(x3,0.8),(x4,0.9)}. Explain the equation for the same.	**10 Marks**	**L3**	**CO3**

17.	**a.**	Summarize the different types of proposition in detail.	**10 Marks**	**L2**	**CO4**
	b.	Let P be a **Mary is intelligent** with the truth value 0.8, q be a **John is intelligent** with the truth value 0.6. Determine the following: i) Mary is not intelligent ii) Both Mary and John are intelligents iii) Either Mary or John is intelligent iv) If mary is intelligent then so is john v) If mary is intelligent if and only if so is john vi) If mary is intelligent then john is not intelligent vii) If mary is not intelligent then is john intelligent.	**10 Marks**	**L3**	**CO4**
		Or			
18.	**a.**	Explain fuzzy logic controller architecture in detail.	**10 Marks**	**L2**	**CO4**
	b.	Let X={1, 2, 3, 4, 5, 6} be the set of force and Y={10,20,30,40,50} be the set of acceleration per minute. The fuzzy set Large(L), Very Large(VL), Huge(H), Very Huge(VH) are associate fuzzy variable set. L={(3,0.9), (4,1), (5,0.4)} VL={(5,0.9), (6,1)} H={(20,1), (30,0.6)} VH={(10,1), (20,0.4)}. Fact is given “If force is huge, acceleration is large”. Solve “acceleration is very large”.	**10 Marks**	**L3**	**CO4**