Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025	
Date: 24 – 12- 2025	**Time:** 01:00pm – 04:00pm

School: SOCSE	**Program:** B.Tech	
Course Code :CSD2017	**Course Name:** Introduction to Neural Network & Fuzzy Logic	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**29**	**24**	**21**	

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.	What is Perceptron Model	**2 Marks**	**L2**	**CO1**
2.	What is Biological and Artificial Neurons	**2 Marks**	**L2**	**CO1**
3.	Define Neuro-Fuzzy Systems	**2 Marks**	**L2**	**CO4**
4.	Define Fuzzy Sets and Membership Functions	**2 Marks**	**L2**	**CO3**
5.	What is Linguistic Variables	**2 Marks**	**L2**	**CO3**
6.	What is Multilayer Perceptron (MLP)	**2 Marks**	**L2**	**CO2**
7.	What is Convolutional Neural Networks (CNNs)	**2 Marks**	**L2**	**CO2**
8.	What is Pattern Recognition	**2 Marks**	**L2**	**CO4**
9.	What is Intelligent Control Systems	**2 Marks**	**L2**	**CO4**
10.	Define Activation Functions	**2 Marks**	**L2**	**CO1**

Part B

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

11.		Explain the structure and functioning of a biological neuron and compare it with an artificial neuron. Discuss how the perceptron learning rule operates with suitable equations and examples.	**10 Marks**	**L3**	**CO1**
Or					
12.		What are activation functions? Describe different types of activation functions (step, sigmoid, tanh, ReLU) and explain their importance in neural network training.	**10 Marks**	**L3**	**CO1**

13.		Describe the architecture of a feedforward neural network. Explain how information flows through the network and how learning takes place.	**10 Marks**	**L3**	**CO1**
Or					
14.	**a.**	Explain the backpropagation algorithm in detail. Include mathematical derivation of weight updates using gradient descent.	**10 Marks**	**L3**	**CO1**

15.	**a.**	Discuss gradient descent and its variants. Explain how learning rate affects convergence and the problems of local minima and vanishing gradients.	**10 Marks**	**L3**	**CO1**
Or					
16.	**a.**	Explain the architecture of a Multilayer Perceptron (MLP). Discuss its capabilities and limitations with respect to universal approximation.	**10 Marks**	**L3**	**CO2**

17.	**a.**	Describe the working of Convolutional Neural Networks (CNNs). Explain the roles of convolution, pooling, and fully connected layers in feature extraction and classification.	**15 Marks**	**L3**	**CO2**
Or					
18.	**a.**	Explain Recurrent Neural Networks	**15 Marks**	**L3**	**CO2**

19.	**a.**	Describe the application of neural networks in pattern recognition. Explain the steps involved: feature extraction, classification, and training.	**15 Marks**	**L3**	**CO4**
Or					
20.	**a.**	Explain the application of neural and fuzzy systems in industrial automation, medical diagnosis, and decision-making.	**15 Marks**	**L3**	**CO4**

21.	**a.**	Describe the processes of fuzzification and defuzzification and Linguistic variable in detail	**20 Marks**	**L3**	**CO3**
Or					
22.	**a.**	Explain Mamdani and Sugeno fuzzy inference models. Compare their structures, advantages, and applications.	**20 Marks**	**L3**	**CO3**