



Roll No

**PRESIDENCY UNIVERSITY  
BENGALURU**

**School Of Computer Science and Engineering**

**End-Term Examinations, Aug 2024**

**Odd Semester:** 2023-24

**Course Code:** CSE3016

**Course Name:** Neural Networks and Fuzzy Logic

**Programme:** B Tech

**Date:** 09.08.2024

**Time:** 09.30 am – 12.30 pm

**Max Marks:** 100

**Weightage:** 50%

**Instructions:**

- (i) Read the all questions carefully and answer accordingly.  
(ii) Do not write any matter on the question paper other than roll number.

Q.No	Questions	Marks	CO	RB T
1	a. What is perceptron? Give limitations of Rosenblat's perceptron?	4	CO1	L1
	b. An activation function is used to decide whether a neuron can be activated or not. Write a note on different activation functions used in neural networks comparing them with graphs, equations, their respective derivatives, features etc etc.	6	CO1	L3
	c. Explain why an MLP does not learn if the initial weights and biases are all zero.	10	CO1	L2

OR

2	a. Describe the characteristics of ANN? What is Perceptron? Describe Multilayer Perceptron?	4	CO1	L1
	b. Neural network learns from its environment and improves its performance. List any 4 types of learning and briefly explain them.	6	CO1	L3
	c. What is a cost function? How it differs from loss function? Write different types of loss functions with respect to regression and classification?	10	CO1	L2

3	a. Define Height and Core of a Fuzzy set with suitable examples?	4	CO2	L1
	b. How do you estimate the error of machine learning algorithms? Explain with reference of repressors and classifiers?	6	CO2	L4
	a. What is overfitting and? What is impact of low bias and high variance on the network? What is the relationship of bias and variance of an ideal model?	10	CO2	L2

OR

4	a. Mention the various applications of Artificial Neural Network?	4	CO2	L3
	b. Back propagation is a commonly used technique for training neural network. Explain the computations with the help of equations happening during forward pass and backward pass.	6	CO2	L2
	c. What is gradient descent? How it is effective in error optimization?	10	CO2	L1

5	a. Define fuzzy set and its basic operation.	4	CO3	L1
	b. Consider two fuzzy sets A and B. Find complement, union, intersection. $A = \{2/1+3/0.6+4/0.6+5/0.2+6/0.6\}$ , $B = \{2/0.6+3/0.8+4/0.4+5/0.7+6/0.3\}$ .	6	CO3	L5
	c. We want to compare two sensors based upon their detection levels and gain settings. The following table of gain settings and sensor detection levels with a standard item being monitored provides typical membership value to represent the detection levels for each of the sensors.	10	CO3	L5

Gain Setting	Sensor-1 (S <sub>1</sub> ) Detection Levels	Sensor-2 (S <sub>2</sub> ) Detection Levels
0	0	0
20	0.5	0.35
40	0.65	0.5
60	0.85	0.75
80	1	0.9
100	1	1

OR

6	a. What is cardinality of fuzzy set?	4	CO3	L1
	b. Using your own intuition and definitions of the universe of discourse, plot fuzzy function for “weight of people” with the help of 5 linguistic variables.	6	CO3	L6
	c. Two fuzzy sets P and Q are defined on x as follows.	10	CO3	L5

$\mu(x_1)$	x1	x2	x3	x4	x5
P	0.1	0.2	0.7	0.5	0.4
Q	0.9	0.6	0.3	0.2	0.8

Find the following  $\lambda$  cut sets:  
(a)  $P_{0.2}$  (b)  $P_{0.3}$  (c)  $(P \cup Q)_{0.5}$  (d)  $(P \cap Q)_{0.4}$  (e)  $(Q \cup P)_{0.8}$  (f)  $(P \cup P)_{0.2}$

7	a. Mention the role of Fuzzy Proposition with example.	4	CO4	L2
	b. Identify the purpose of Linguistic Hedges. What are the unary operations applied on it?	6	CO4	L4
	c. Differentiate Generalized Modus Ponens (GMP) & Generalized Modus Tollens (GMT) with suitable example.	10	CO4	L4

OR

8	a. List the need of Fuzzy Quantifiers along with proper example.	4	CO4	L3
	b. Classify Fuzzy Proposition with example	6	CO4	L4
	c. Define fuzzy sets Small and Large on $Y = \{1,2,3,4,5\}$ as: $Small = \frac{1}{1} + \frac{0.8}{2} + \frac{0.6}{3} + \frac{0.4}{4} + \frac{0.2}{5}$ $Large = \frac{0.2}{1} + \frac{0.4}{2} + \frac{0.6}{3} + \frac{0.8}{4} + \frac{1}{5}$ Obtain the fuzzy sets representing: i) Fairly small ii) Very very large	10	CO4	L5

9	a. List the applications of ANN.	4	CO1	L2
	b. How artificial neuron is inspired from the biological neuron? Explain	6	CO1	L4
	c. Explain various types of activation functions used in artificial neural network.	10	CO1	L2

OR

10	a. How are ANNs classified on the basis of training imparted to them? Give in detail.	4	CO2	L4
	b. Identify the function of hidden neurons of hidden layer in MLP?	6	CO2	L4
	c. What does Artificial Intelligence (AI) mean? What are its salient characteristics? Differentiate conventional AI from other AI based techniques. Distinguish between human and machine intelligence.	10	CO2	L2