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**Presidency University**

**Bengaluru**

 **School of Engineering & School of Computer Science Engineering**

**Make up Examinations – july 2024**

**Date**: 10/07/2024

**Time**: 1:30pm – 4:30pm

**Max Marks**: 100

**Weightage**: 50%

**Even Semester**: IV

**Course Code**: CSE2016

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

**Department:** Computer Science and Engineering

 **Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Do not write any matter on the question paper other than roll number.*
3. *Scientific Calculators, mobile phones or any resources (internet) are STRICTLY PROHIBITED.*

 **PART A (CO1, Comprehension)**

 **Answer any six questions. 6x5= 30 Marks**

* 1. Define Artificial Neural Network?
	2. What is perceptron? Give limitations of Rosenblat’s perceptron?
	3. Describe the characteristics of ANN? What is Perceptron? Describe Multilayer Perceptron?
	4. Define Height and Core of a Fuzzy set with suitable examples?
	5. Define fuzzy inference. List the different types of fuzzy inference?
	6. Recall Fuzzy quantifier and their types?
	7. Distinguish between Discrete and Continuous Fuzzy set?
	8. Explain the properties of alpha-cut in detail?

**PART B (CO2, Comprehension)**

**Answer any five questions. 5x6=30 Marks**

* 1. 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.
	2. Neural network learns from its environment and improves its performance. List any 4 types of learning and briefly explain them.
	3. 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.
	4. How do you estimate the error of machine learning algorithms? Explain with reference of repressors and classifiers?
	5. Let a,b,c,d and e be five students who scored 55,35,60, 85 and 75 out of 100 respectively in Science. For the universe discourse U={a,b,c,d,e} defined on Fuzzy set S with following membership function. Compute the membership value of each element of Fuzzy set S using the below formula and draw the graph.
	6. Give the equation to find algebraic sum and algebraic difference of two fuzzy sets. And also apply the same formula on the 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)}.
	7. Demonstrate equal and complement of Fuzzy sets with an example.

 **PART C (CO3, Problem Solving)**

 **Answer any 3 Questions. (4Qx 10M= 40M)**

* 1. Explain Bias and variance in details with respect to overfitting and under fitting?
	2. What is a cost function? How it differs from loss function? Write different types of loss functions with respect to regression and classification?
	3. What is gradient descent? How it is effective in error optimization? Explain with diagram and impact of learning rate on it?
	4. What is overfitting an d? What is impact of low bias and high variance on the network? What is the relationship of bias and variance of an ideal model?
	5. Explain in detail the different types of Fuzzy relations and Fuzzy set operations?
	6. Max min composition and Max product composition Let A and B be two fuzzy relations expressed in the matrix form, Find C, the composition of two fuzzy relations. Also find the max-product composition for the same?