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BTECH
(SEM V) THEORY EXAMINATION 2024-25
NEURAL NETWORKS & FUZZY SYSTEM

TIME: 3 HRS

M.MARKS: 100

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

Q no.	Question	CO	Level
a.	What is a neuron, and what are its primary components?	1	K2
b.	Define synapse in the context of a neuron.	1	K2
c.	How does the quality of the training data impact the effectiveness of backpropagation training?	2	K2
d.	What is overfitting in backpropagation training?	2	K2
e.	List two differences between a crisp set and a fuzzy set.	3	K2
f.	What is a fuzzy relation in fuzzy set theory?	3	K2
g.	Write a short note on fuzzy implication.	4	K2
h.	What are the basic steps involved in designing a fuzzy algorithm?	4	K2
i.	List four advantage of using fuzzy backpropagation.	5	K2
j.	Define fuzzy inference in the context of backpropagation.	5	K2

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

Q no.	Question	CO	Level
a.	Explain the basic structure of a nerve. What are the main components that make up a nerve in the human body?	1	K2
b.	How does the choice of the activation function (e.g., Sigmoid, ReLU) influence the backpropagation training process?	2	K2
c.	Discuss the union, intersection, and complement operations in fuzzy set theory with suitable examples.	3	K2
d.	Provide an example of a real-world application that uses a fuzzy algorithm for control or decision-making.	4	K2
e.	How can LR-type fuzzy numbers represent both symmetric and asymmetric fuzzy numbers?	5	K2

SECTION C

3. Attempt any one part of the following: 10 x 1 = 10

Q no.	Question	C O	Level
a.	Use the Hebb rule of discrete BAM, find the weight matrix to store the following (binary) input-output patterns pairs. $S(1) = (1,1,0)$ $t(1) = (1,0)$ $S(2) = (0,1,0)$ $t(2) = (0,1)$	1	K3
b.	According to which rule each neuron updates its state in Hopfield network? What is the dynamic behavior of Hopfield network?	1	K3



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4. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Draw and explain an architecture of multilayer network. Also discuss the practical application of it.	2	K3
b.	What is the significance of error signal in perceptron network. Explain it with suitable example.	2	K3

5. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Discuss the importance of fuzzy logic in our daily life. What is the role of crisp sets in fuzzy logic.	3	K3
b.	Verify De Morgans's Law using truth table (For 3 states).	3	K3

6. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	What is fuzzy implication, and how does it differ from classical implication in Boolean logic?	4	K3
b.	Define fuzzification and defuzzification. Why are they necessary in fuzzy algorithms?	4	K3

7. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	How can fuzzy controllers be used for temperature control in HVAC systems? Outline the steps.	5	K3
b.	Discuss the challenges of managing a large rule base in Fuzzy BP learning.	5	K3