K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:VI
Class:TY	Program:B.Tech
Branch Code:ADS	Pattern:2022
Name of Course:Neural Network and Fuzzy Logic	Course Code:ADS223014(B)
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	**Explain the process of modeling a neuron for artificial neural systems and differentiate between feed-forward and feedback (recurrent) network architectures.**	(6)	CO1
Question No. 2			
2a)	**Compare Hebbian Learning, Perceptron Learning, and Widrow-Hoff Learning rules.**	(6)	CO2
Question No. 3			
3a)	**Explain the working mechanism of the perceptron learning algorithm. How does it update weights during training?**	(8)	CO3
	OR		
3b)	**Compare Feed-forward Neural Networks and Feedback (Recurrent) Neural Networks based on structure, information flow, and applications.**	(8)	CO3
3c)	**Explain how Hyperparameters such as Learning Rate, Regularization Strength, Momentum, and Sparsity affect convergence, overfitting, and learning stability in neural networks.**	(8)	CO3
	OR		
3d)	**Explain the role of Momentum in speeding up neural network training.**	(8)	CO3
Question No. 4			
4a)	**Explain the concept of "degree of membership" in fuzzy sets. How does partial membership help in representing real-world uncertainty?**	(8)	CO4
	OR		
4b)	**Explain the process of fuzzification. Why is fuzzification necessary in a fuzzy inference system? Provide an example using a real-world input.**	(8)	CO4
4c)	**Compare Fuzzy sets and Crisp sets.**	(8)	CO4
	OR		
4d)	**Explain fuzzy complement, fuzzy intersection, and fuzzy union.**	(8)	CO4

Question No. 5

5a)	**Explain the architecture and working principles of a Fuzzy Logic Controller (FLC)**	(8)	CO5

OR

5b)	**Explain the concept of linguistic variables in fuzzy logic and discuss how linguistic hedges modify the shape and behavior of membership functions.**	(8)	CO5
5c)	**Compare different types of Fuzzy Logic Controllers.**	(8)	CO5

OR

5d)	**Explain fuzzification techniques such as singleton, Gaussian, and triangular fuzzification. Compare their implications in fuzzy control.**	(8)	CO5

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