S.No. : 654 NAI4502

No. of Printed Pages : 04

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 43903 Roll No.

B. Tech Examination 2025-26

(Odd Semester)

ARTIFICIAL NEURAL NETWORK

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : $8 \times 1 = 8$

   (a) What is a neural network?

   (b) What is meant by weight updating in neural networks?

   (c) Define error correction learning.

   (d) State the purpose of a linear least squares filter.

[P. T. O.

(e) Why is the XOR problem not solvable by a single-layer perceptron?

(f) What is overfitting?

(g) What is generalization in neural networks?

(h) What is accelerated convergence?

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Explain how directed graphs help in representing and analyzing the flow of activation and error signals in a neural network.

(b) What is adaptive filtering problem? Explain in brief.

(c) What are network pruning techniques? Explain their types, advantages, and impact on model performance.

(d) Explain the architecture and working principle of a single-layer perceptron and multilayer perceptron.

SECTION – C

Note:- Attempt all questions. Attempt any two parts from each question. $8 \times 5 = 40$

3. (a) Explain in detail the architecture and functioning of an artificial neural network(ANN) and also compare it with biological neural network.

   (b) What is unconstrained organization techniques? Explain some unconstrained optimization techniques used in neural network.

   (c) Explain the working of supervised learning in neural networks with examples.

4. (a) What is the credit assignment problem? How is it handled in neural networks?

   (b) Explain the relationship between the perceptron and Bayes classifier for a Gaussian environment.

   (c) Describe the cross-validation technique and explain how it helps in preventing overfitting.

5. (a) Discuss the role of memory and adaptation in neural networks.

(b) Define learning curves and its types.

(c) Discuss the role of differentiation and the Hessian Matrix in the optimization process of neural networks.

6. (a) Explain the different types of learning rules in neural networks.

(b) What is least mean square algorithms? Explain cost function with an example.

(c) Explain the backpropagation algorithm in detail.

⌘⌘⌘