

(3 Hours)

Total Marks: 80

- N.B.:** 1) Question No.1 is **compulsory**.  
 2) Attempt any **THREE** of the remaining five questions.  
 3) Figures to the right indicate full marks.

- Q1.** Write a Short Note on **Any Four** [20]  
 (a) Supervised Learning vs. Unsupervised Learning [5]  
 (b) Bagging vs. Boosting [5]  
 (c) Applications of Convolutional Neural Networks [5]  
 (d) Learning XOR Function [5]  
 (e) Dataset Augmentation [5]
- Q2.** (a) What are Ensemble Methods? Explain any one Ensemble Method with example. [10]  
 (b) Describe the role of activation functions in deep neural networks. Compare and contrast at least three commonly used activation functions, highlighting their characteristics, advantages, and potential limitations. [10]
- Q3.** (a) Compare and contrast a Single Unit Perceptron with a Multi-Layered Perceptron (MLP). [10]  
 (b) Discuss the purpose and respective roles played by Convolutional Layers and Pooling Layers in a Convolutional Neural Network. [10]
- Q4.** (a) What is an LSTM network? Highlight its differences from a traditional RNN [10]  
 (b) Explain the backpropagation algorithm in detail, including its role in training deep neural networks. [10]
- Q5.** (a) What is the fundamental difference between a standard feedforward neural network and a Recurrent Neural Network (RNN)? Provide a brief explanation of how RNNs are specifically designed to handle sequential data. [10]  
 (b) List various optimization strategies and algorithms used in the training of Deep Learning models. Explain any one in detail. [10]
- Q6.** (a) What is regularization? Explain any two regularization strategies in detail [10]  
 (b) Discuss the advantages and challenges of employing multi-task learning compared to single-task learning approaches. Provide examples to illustrate your points. [10]