(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER-2024

Paper Code: AIML-305 ***Subject: Fundamentals of Deep Learning***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions in all including Q.No. 1 which is compulsory. Select one question from each unit.

Q1 (a) What is the vanishing gradient problem, and how do activation functions address it? **(5)**

(b) Explain Shallow Learning. **(5)**

(c) Draw and discuss a multilayer neural architecture. **(5)**

(d) What is the significance of activation functions in neural networks. **(5)**

(e) Explain the role of Pooling Layers in CNNs. **(5)**

UNIT-I

Q2 (a) Explain the difference between Deep Learning and Shallow Learning. Why there is a shift from shallow learning to Deep Learning. **(6.5)**

(b) Define a loss function in the context of Deep Learning. Classify and discuss their types. **(6)**

OR

Q3 (a) Define Deep Learning and briefly explain its significance. Discuss Bayesian Learning with suitable example. **(6)**

(b) Discuss the role of gradient descent in optimizing neural network models. Explain the concept of batch optimization. Write step by step procedure to apply it. **(6.5)**

UNIT-II

Q4 (a) Describe the structure of a biological neuron and its relevance to artificial neural networks. **(6.5)**

(b) Discuss Single Layer Neural Networks and Multilayer Perceptrons. Explain the Back Propagation algorithm. **(6)**

OR

Q5 (a) Explain the idea of computational units and introduce the McCulloch–Pitts unit. Also provide differences between McCulloch & Pitt's Model and Perceptron Model. Draw OR function. **(6)**

(b) Elaborate architectural design issues in neural network models and provide two resolutions. **(6.5)**

UNIT-III

Q6 (a) Discuss the role of activation functions and techniques for evaluating, improving, and tuning artificial neural networks (ANNs).What are some common activation functions used in deep learning? Why is ReLU a popular choice as an activation function? **(6.5)**

(b) How does an RNN differ from a traditional feed forward neural network? What is the concept of hidden states in an RNN? **(6)**

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OR

Q7 (a) What are Long Short-Term Memory (LSTM) networks and Gated Recurrent Units (GRUs)? **(6)**

(b) Explain the challenges in training deep neural networks. Elaborate Overfitting and Hyperparameter Tuning. **(6.5)**

UNIT-IV

Q8 (a) Define Convolutional Neural Networks (CNNs) and discuss their building blocks. **(6)**

(b) Explain the architecture and functioning of VGG-16, including key elements. Highlight both the advantages, and the drawbacks, associated with VGG-16. **(6.5)**

OR

Q9 (a) Explain the concept of Transfer Learning in Convolutional Neural Networks (CNNs). Discuss how pre-trained models can be utilized for tasks with limited data. **(6)**

(b) Provide a detailed explanation of LeNET-5, its architecture and working principles. Discuss its advantages and limitations. **(6.5)**

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