Exam.Code:0924
Sub. Code: 33571

2055

B.E. (Information Technology) Sixth Semester

OEIT-601: Deep Learning

Time allowed: 3 Hours | Max. Marks: 50

***NOTE:*** *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

*x-x-x*

1. Attempt the following:-

   a) What was the significance of the McCulloch-Pitts Neuron in the history of Deep Learning?

   b) How does gradient descent optimize the loss function in neural networks?

   c) What is the difference between Sigmoid and ReLU activation functions?

   d) Define Principal Component Analysis (PCA) and its primary application in deep learning.

   e) What is the role of an autoencoder, and how does it relate to PCA?

   f) Explain the concept of L2 regularization in neural networks.

   g) How does batch normalization help in training deep neural networks?

   h) What is the fundamental difference between LeNet and AlexNet?

   i) What is Backpropagation Through Time (BPTT), and why is it necessary for RNNs?

   j) What is the attention mechanism, and how does it improve deep learning models? (10x1)

## UNIT - I

II. Explain the Perceptron Learning Algorithm in detail. Derive its update rule and discuss its limitations in solving non-linearly separable problems. (10)

III. Compare different variants of Gradient Descent (GD, Momentum-based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam). Provide their mathematical formulations and discuss their advantages and disadvantages. (10)

P.T.O.

IV. Explain Singular Value Decomposition (SVD) and its role in dimensionality reduction. How does Autoencoder regularization relate to PCA? Provide mathematical derivations where necessary. (10)

## UNIT - II

V. What is Dropout in deep learning? Explain the concept mathematically and discuss how dropout prevents overfitting in neural networks. (10)

VI. Discuss the architecture of GoogLeNet (Inception Network) in detail. Explain how Inception modules improve computational efficiency. (10)

VII. Compare LSTMs and GRUs in detail. Explain how they mitigate the vanishing gradient problem in recurrent neural networks. (10)

*x-x-x*