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Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: CSD2014 **Course Name:** Deep Learning for Data Science

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	70	66	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Define a perceptron and state its basic components.	2	CO1	BT1
2	A perceptron is a basic neural unit that produces an output from weighted inputs. Components: inputs, weights, bias, summation, and activation function.	2	CO1	BT1
3	Differentiate between overfitting and underfitting.	2	CO2	BT2
4	What is a Convolutional Neural Network (CNN)? Mention one application.	2	CO3	BT1
5	What is a Gated Recurrent Unit (GRU)? Mention one advantage over a conventional RNN.	2	CO3	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Explain the architecture and working of a Multilayer Perceptron (MLP). Discuss the role of activation functions, loss functions, and gradient descent in training an MLP.	10	CO1	BT2
7	Explain the architecture and working of a Convolutional Neural Network (CNN). Discuss convolution, filters, feature maps, pooling, and fully connected layers with their roles in image classification.	10	CO3	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Describe the backpropagation algorithm used for training a feedforward neural network. Explain the forward pass, loss calculation, backward pass, gradient calculation, and weight update.	10	CO2	BT3
9	Explain transfer learning in deep learning. Describe the process of using a pre-trained CNN for a new classification task and discuss its advantages and limitations.	10	CO3	BT3

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
10	Analyze the major practical issues encountered during neural network training. Explain overfitting, regularization, dropout, batch normalization, and hyperparameter selection as methods for improving generalization.	10	CO2	BT4

11	Compare AlexNet and ResNet architectures with respect to their structure, major innovations, training challenges, and applications.	10	CO3	BT4

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	A healthcare technology company is developing a deep neural network to predict a patient's health condition from a long sequence of medical measurements collected over several days. During training, the development team observes the following: In the early layers, the gradients become extremely small, and the weights change very slowly.The network takes a long time to learn important patterns from the sequence.In some training runs, the gradients become extremely large, causing the loss value to fluctuate or become NaN.The problem becomes more severe as the network depth increases.Questions a) Identify the two gradient-related problems observed in the case study. (2 Marks) b) Explain the major causes of these problems in a deep neural network. (3 Marks) c) Analyze their effects on the training process. (2 Marks) d) Suggest suitable techniques to overcome these problems. (3 Marks)	10	CO2	BT4
13	**Case Study** A college wants to develop an AI system to predict students' attendance for the next week. The system uses students' attendance records from previous weeks as sequential data. The development team considers three deep learning models: RNN, LSTM, and GRU. They need to understand how these models remember previous attendance information and handle long-term patterns. Questions a) How does an RNN process students' attendance records? (2 Marks) b) What is the role of memory in RNN, LSTM, and GRU? (2 Marks) c) Compare the gates used in LSTM and GRU. (2 Marks) d) Why may LSTM or GRU perform better than a basic RNN for long-term attendance patterns? (2 Marks) e) Compare LSTM and GRU in terms of computational complexity. (2 Marks)	10	CO3	BT4