Reg. No. : | | | | | | | | | | | | |

Question Paper Code: R5G01

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Fifth Semester

CSE(Artificial Intelligence and Machine Learning)

R21UAM501- INTRODUCTION TO NEURAL NETWORKS AND DEEP LEARNING TECHNIQUES

(Regulations R2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	What is the main difference between deep learning and traditional machine learning?	CO1- U
2.	Explain the concept of probabilistic modeling in deep learning	CO3-App
3.	Describe the role of activation functions in neural networks.	CO1- U
4.	Specify the advantages of ReLU over sigmoid activation function.	CO1- U
5.	Present an outline of pooling layer in convolutional neural network.	CO3-App
6.	Explain pooling layer in CNN.	CO 1- U
7.	Why RNN is suitable for sentiment analysis?	CO 1- U
8.	In a speech recognition task, how would you apply a bidirectional RNN to improve accuracy compared to a standard RNN?	CO3-App
9.	Define policy in the context of reinforcement learning.	CO 1- U
10.	Discuss the role of the discriminator in Generative Adversarial Networks (GANs).	CO4-Ana

PART – B (5 x 16= 80 Marks)

11.	(a)	Differentiate scalar, vector, matrix, and tensor with one real-world application of each in the context of Deep Learning. Include one example for each using NumPy or PyTorch.	CO2- App	(16)
		Or		
	(b)	Build a Deep Neural Network for XOR problem using Keras.	CO2- App	(16)

12.	(a)	Demonstrate the application of stochastic gradient descent optimization by formulating and solving a real-world or custom-defined problem.	CO3- App	(16)
		Or		
	(b)	Construct a simple neural network performing classification on MNIST Handwritten Digit dataset.	CO3- App	(16)
13.	(a)	Draw and explain the architecture of Convolutional Neural Networks.	CO1- U	(16)
		Or		
	(b)	Explain the following with suitable diagram. i. Sparse interactions. ii. Parameter sharing.	CO1- U	(16)
14.	(a)	Design a basic RNN model for sentiment analysis to predict the number of positive and negative reviews based on sentiments of a movie reviews with appropriate normalization and optimization technique. Also clearly analyze the model design.	CO4- Ana	(16)
		Or		
	(b)	Consider a deep recurrent network designed for image compression. Analyze: i. The role of each RNN layer in encoding and decoding ii. How loss functions are chosen for compression iii. The effect of vanishing gradients and how it is mitigated	CO4- Ana	(16)
15.	(a)	Draw the Variational Autoencoder (VAE) architecture and explain the role of encoder, decoder, and latent variables. Derive the loss function. Also mention two real-world applications of VAE.	CO1- U	(16)
		Or		
	(b)	Explain Q-Learning in detail	CO1- U	(16)