Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 29-05-2025 **Time:** 09:30 am – 12:30 pm

School: SOCSE	**Program:** B. Tech- CAI/COM/CSE/CSG/ISE	
Course Code: CSE3189	**Course Name:** DEEP LEARNING	
Semester: VI	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**
Marks	**24**	**24**	**26**	**26**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Illustrate the syntax to compile the model with 'optimizer',' loss' and 'metrics' hyperparameters set to values of your choice.	**2 Marks**	**L2**	**CO1**
2.	Build a NN with 2 Input neurons and 2 hidden layers each with 3 Neurons and 1 output layer with 2 neurons.	**2 Marks**	**L1**	**CO1**
3.	Illustrate a simple Python snippet using Keras to define an LSTM layer for sequence prediction. Assume input shape is (10,1) and number of units=50.	**2 Marks**	**L2**	**CO2**
4.	What is a GRU and how is it different from LSTM?	**2 Marks**	**L1**	**CO2**
5.	Outline the architecture of an RBM and explain how the visible and hidden layers interact.	**2 Marks**	**L2**	**CO3**
6.	Illustrate a basic Keras code snippet to define the encoder part of a Convolutional Autoencoder for 28x28 grayscale images.	**2 Marks**	**L2**	**CO3**
7.	Demonstrate the working principle of a Hopfield Network.	**2 Marks**	**L2**	**CO4**
8.	Explain any two basic components of Reinforcement Learning.	**2 Marks**	**L2**	**CO4**

9.	Illustrate a simple Python code snippet using TensorFlow/Keras to define the architecture of a basic Autoencoder with one hidden layer.	**2 Marks**	**L2**	**CO3**
10.	Illustrate a simple Python code snippet to define the generator model of a basic GAN using TensorFlow/Keras.	**2 Marks**	**L2**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Develop a basic Artificial Neural Network (ANN) model using Keras with TensorFlow backend to predict diabetes using the Pima Indians Diabetes dataset.	**10 Marks**	**L3**	**CO 1**
	b.	In the pursuit of building highly accurate machine learning models, how can we ensure that a model not only fits the training data well but also generalizes effectively to unseen data? What role does regularization play in achieving this balance, and what are the different regularization techniques available to control model complexity and prevent overfitting?	**10 Marks**	**L2**	**CO 1**
		Or			
12.	**a.**	Develop a Multilayer Perceptron (MLP) neural network model using Keras (with TensorFlow backend) to perform classification on the House_price.csv dataset? The implementation should include essential steps such as data preprocessing, model design, training, and evaluation.	**10 Marks**	**L3**	**CO 1**
	b.	In deep learning, where models can have millions of parameters, what truly governs their training behavior and good performance? How important is the art of hyperparameters tuning in unlocking a model's full potential, and which key hyperparameters play the most significant roles in shaping the training dynamics of a neural network?	**10 Marks**	**L2**	**CO 1**

13.	**a.**	Develop a sentiment analysis model on IMDB dataset by using LSTM model. Perform model compilation, training and evaluation.	**10 Marks**	**L3**	**CO** 2
	b.	Convolutional Neural Networks (CNNs) mimic the way humans perceive visual information, and why are they so effective in processing image data compared to traditional neural networks? Explain the architecture and functioning of a CNN—highlighting the specific roles of convolutional, pooling, and fully connected layers—with the help of a clear diagram?	**10 Marks**	**L2**	**CO 2**
		Or			
14.	**a.**	Develop a GRU-based model using Python and Keras for language translation. Perform model compilation, training and evaluation.	**10 Marks**	**L3**	**CO 2**

	b.	Explain the architecture of RNN and training process in detail. Support your answer with diagrams and equations.	**10 Marks**	**L2**	**CO 2**

15.	**a.**	Given the following 2D input vectors: X1 = [0.2, 0.6] X2 = [0.8, 0.4] The Kohonen network has 2 output neurons (let's say W1 and W2), and the initial weights are: W1 = [0.5, 0.5] W2 = [0.1, 0.2] Let the learning rate $\eta = 0.5$ Train with input X1 and X2 only for 1 iteration and update the weights.	**10 Marks**	**L3**	**CO 3**
	b.	Develop a Generative Adversarial Network (GAN) model using TensorFlow/Keras to generate handwritten digits similar to the MNIST dataset.	**10 Marks**	**L3**	**CO 3**
		Or			
16.	**a.**	Given the following 2D input vectors: Use two 2D input vectors: X1 = [0.2, 0.8] X2 = [0.5, 0.5] The Kohonen network has 2 output neurons (let's say W1 and W2), and the initial weights are: W1 = [0.1, 0.9] W2 = [0.8, 0.2] Let the learning rate $\eta = 0.5$ Train with input X1 and X2 only for 1 iteration and update the weights.	**10 Marks**	**L3**	**CO 3**
	b.	Develop a Denoising Autoencoder using TensorFlow/Keras to reconstruct clean images from noisy inputs using the MNIST dataset.	**10 Marks**	**L3**	**CO 3**

17.	**a.**	For the given Hop Field Network with Input pattern: 11011, 10101 calculate weight matrix and find the correct pattern of distorted pattern (11110) with the given sequence as 5 3 4 1 2.	**10 Marks**	**L3**	**CO 4**

	b.	Explain the architecture and working of Deep Belief Networks (DBNs). Discuss how DBNs are trained using greedy layer-wise learning.	**10 Marks**	**L2**	**CO 4**
		Or			
18.	**a.**	For the given Hop Field Network with Input pattern: 10110, 11001 calculate weight matrix and find the correct pattern of distorted pattern (11100) with the given sequence as 5 3 4 1 2.	**10 Marks**	**L3**	**CO 4**
	b.	Explain the architecture and working principle of a Probabilistic Neural Network (PNN).	**10 Marks**	**L2**	**CO 4**