SRM VALLIAMMAI ENGEINEERING COLLEGE

(An Autonomous Institution)

DEPARTMENT OF COMPUTER APPLICATIONS

QUESTION BANK

II SEMESTER

PMC405 MACHINE LEARNING AND DEEP LEARNING

Regulation – 2024

Academic Year 2025- 2026

Prepared by

Dr. K. PONMOZHI, Associate Professor / MCA

SRM VALLIAMMAI ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER APPLICATIONS

QUESTION BANK

SUBJECT : PMC405 MACHINE LEARNING AND DEEP LEARNING
SEM / YEAR : III / II year MCA

UNIT I- LEARNING PROBLEMS AND ALGORITHMS **Various paradigms of learning problems, Supervised, Semi-supervised and Unsupervised Algorithms**				
Q.No.	**Question**	**Bloom's Taxonomy Level**	**Competence**	**Course Outcome**
	PART – A			
1.	Differentiate supervised and unsupervised learning	BTL -1	Remembering	CO 1
2	Differentiate between supervised and unsupervised learning.	BTL -2	Understanding	CO 1
3	Explain the role of the target variable in supervised learning.	BTL -2	Understanding	CO 1
4	What is a labeled dataset?	BTL -1	Remembering	CO 1
5	List two examples of unsupervised learning algorithms.	BTL -2	Understanding	CO 1
6	State any two applications of semi-supervised learning	BTL -1	Remembering	CO 1
7.	Why is semi-supervised learning useful in real-world scenarios?	BTL -2	Understanding	CO 1
8.	What do you mean by a learning paradigm?	BTL -1	Remembering	CO 1
9.	Interpret how clustering works as an unsupervised learning technique	BTL -2	Understanding	CO 1
10	Describe the structure of a labeled and unlabeled dataset in semi-supervised learning.	BTL -1	Remembering	CO 1
11	Apply K-means clustering to a customer segmentation problem – what features would you use?	BTL -3	Applying	CO 1
12	How would you classify an email as spam using supervised learning?	BTL -3	Applying	CO 1
13	Which learning paradigm would be most suitable for detecting anomalies in network traffic and why?	BTL -3	Applying	CO 1
14.	What challenges arise in choosing the correct learning paradigm for a medical diagnosis system?	BTL -4	Analyse	CO 1
15.	Analyze the performance differences between supervised and unsupervised learning in text classification.	BTL -4	Analyse	CO 1
16.	Justify the use of supervised learning in speech recognition systems.	BTL -2	Understanding	CO 1

17.	Explain why clustering is considered an unsupervised learning technique.	BTL -2	Understanding	CO 1
18.	Describe the importance of training data in supervised learning.	BTL -1	Remembering	CO 1
19.	Discuss how unsupervised learning discovers hidden patterns in data.	BTL -1	Remembering	CO 1
20.	Explain the role of human labeling in supervised and semi-supervised learning.	BTL -1	Remembering	CO 1
21.	Describe a case where supervised learning may fail but unsupervised learning may work.	BTL -2	Understanding	CO 1
22.	Describe how a mix of labeled and unlabeled data is processed in semi-supervised learning.	BTL -1	Apply	CO 1
23.	Explain how feedback helps in training supervised models.	BTL -2	Understanding	CO 1
24.	Discuss how anomaly detection can benefit from unsupervised learning.	BTL -1	Remembering	CO 1
25.	llustrate the application of semi-supervised learning in real-life problems like disease prediction.	BTL -2	Understanding	CO 1
	PART – B			
1.	Define and explain the different types of learning paradigms in machine learning with suitable examples.	BTL -1	Remembering	CO 1
2.	Differentiate between supervised, unsupervised, and semi-supervised learning in terms of data requirements, learning goals, and applications.	BTL -3	Applying	CO 1
3.	With the help of diagrams, explain how labeled, unlabeled, and partially labeled datasets are used in various learning paradigms.	BTL -3	Applying	CO 1
4.	Illustrate the advantages and limitations of each learning paradigm with suitable use cases.	BTL -4	Analyzing	CO 1
5.	Select a real-world problem and demonstrate how each of the three paradigms (supervised, unsupervised, semi-supervised) can be used to approach it differently.	BTL -4	Analyzing	CO 1
6.	Explain how unsupervised learning can be applied in feature extraction. Support your answer with an example and explain the process.	BTL5	Evaluating	CO 1
7.	Analyze a scenario where unsupervised learning may give better results than supervised learning. Justify with examples and model behavior.	BTL -4	Analyzing	CO 1
8.	Compare K-Nearest Neighbors (KNN) and K-Means in terms of learning paradigm, data type, and problem-solving capability.	BTL -4	Analyzing	CO 1
9.	Design a customer segmentation solution using unsupervised learning. Clearly explain feature selection, algorithm choice, and interpretation.	BTL -3	Applying	CO 1
10.	Explain in detail the working of supervised learning. Compare its use in classification and regression problems with real-life examples.	BTL -2	Understanding	CO 1

11.	Apply supervised learning to a spam email detection problem. Describe preprocessing, algorithm selection, and evaluation.	BTL -3	Applying	CO 1
12.	Analyze the role of data quality and quantity in determining the performance of supervised vs. semi-supervised algorithms.	BTL -3	Applying	CO 1
13.	Identify the challenges of implementing semi-supervised learning in practical scenarios. Suggest solutions and optimizations.	BTL5	Evaluating	CO 1
14.	Design a hybrid learning model that combines both supervised and unsupervised learning techniques. Justify your architecture and learning flow.	BTL6	Creating	CO 1
15.	Devise a strategy using semi-supervised learning for document classification where only 10% of the documents are labeled. Explain each phase of your approach.	BTL -3	Applying	CO 1
16.	Assess the limitations of clustering algorithms in high-dimensional data and evaluate dimensionality reduction as a preprocessing step.	BTL -4	Analyzing	CO 1
17.	Propose a novel solution to automate customer feedback analysis using a combination of learning paradigms. Include the flowchart and justification.	BTL6	Creating	CO 1

UNIT II NEURAL NETWORKS

Differences between Biological and Artificial Neural Networks – Typical Architecture, Common Activation Functions, Multi-layer neural network, Linear Separability, Hebb Net, Perceptron, Adaline, Standard Back propagation Training Algorithms for Pattern Association - Hebb rule and Delta rule, Hetero associative, Auto associative, Kohonen Self Organizing Maps, Examples of Feature Maps, Learning Vector Quantization, Gradient descent, Boltzmann Machine Learning.

Q.No.	Question	Bloom's Taxonomy Level	Competence	Course Outcome
	PART – A			
1.	What is an artificial neural network (ANN)?	BTL-2	Understanding	CO 2
2.	List two differences between biological and artificial neural networks.	BTL-2	Understanding	CO 2
3.	Define linear separability in neural networks.	BTL-2	Understanding	CO 2
4.	What is a perceptron?	BTL-1	Remembering	CO 2
5.	Name any two common activation functions used in ANN.	BTL-2	Understanding	CO 2
6.	What is the role of the bias term in a neuron model?	BTL-1	Remembering	CO 2
7.	List the basic components of a multi-layer neural network.	BTL-1	Remembering	CO 2
8.	Define the Hebb learning rule.	BTL-2	Understanding	CO 2
9.	What is an Adaline network?	BTL-2	Understanding	CO 2
10.	State the delta learning rule.	BTL-2	Understanding	CO 2
11.	What is auto-associative memory?	BTL-2	Understanding	CO 2
12.	What is the purpose of Kohonen Self Organizing Maps?	BTL-5	Evaluating	CO 2
13.	List any two examples of feature maps in neural networks.	BTL-1	Remembering	CO 2
14.	What is the principle of Learning Vector Quantization (LVQ)?	BTL-2	Understanding	CO 2

15.	What is a Boltzmann machine?	BTL-5	Evaluating	CO 2
16.	**E**xplain how artificial neural networks mimic the biological brain.	BTL-1	Remembering	CO 2
17.	Describe the architecture of a simple perceptron.	BTL-2	Understanding	CO 2
18.	Differentiate between Hebb Net and Adaline.	BTL-1	Remembering	CO 2
19.	How does the delta rule update weights in supervised learning?	BTL-1	Remembering	CO 2
20.	Explain how multi-layer neural networks can solve non-linearly separable problems.	BTL-1	Remembering	CO 2
21.	What is the difference between auto-associative and hetero-associative memory networks?	BTL-2	Understanding	CO 2
22.	Describe how backpropagation works in training a neural network.	BTL-1	Remembering	CO 2
23.	Compare sigmoid and ReLU activation functions with their graphs.	BTL-1	Remembering	CO 2
24.	Explain how gradient descent is used to minimize the error in training.	BTL-1	Remembering	CO 2
25.	What is the significance of feature maps in self-organizing maps?	BTL-2	Understanding	CO 2
	PART –B			
1.	Explain the architecture of a typical artificial neural network with a neat diagram.	BTL-1	Remembering	CO 2
2.	Describe the working of commonly used activation functions (Step, Sigmoid, Tanh, ReLU). Include mathematical expressions and graphs.	BTL-1	Remembering	CO 2
3.	Define and explain the structural differences between Biological and Artificial Neural Networks. Illustrate with diagrams.	BTL -2	Understanding	CO 2
5.	Discuss linear separability with respect to neural networks. How does it affect the learnability of problems using perceptrons?	BTL-4	Analyzing	CO 2
6.	Compare and contrast Hebb Net, Perceptron, and Adaline in terms of architecture, learning rule, and output.	BTL-4	Analyzing	CO 2
7.	Apply the Hebbian learning rule to a 2-neuron network. Show how weights are updated using an example dataset.	BTL-3	Applying	CO 2
8.	Apply the delta learning rule on a binary classification task using Adaline. Provide numerical steps of weight updates.	BTL-3	Applying	CO 2
9.	Explain with a block diagram how the standard backpropagation algorithm works in multi-layer neural networks.	BTL -3	Applying	CO 2
10.	Construct a simple neural network model to solve the XOR problem and demonstrate why a single-layer perceptron fails.	BTL-4	Analyzing	CO 2
11.	Analyze the differences between auto-associative and hetero-associative networks with examples and architecture.	BTL -3	Applying	CO 2

12.	How does gradient descent function as an optimization algorithm for minimizing error? Analyze its convergence behavior.	BTL -3	Applying	CO 2
13.	Examine the learning process of Kohonen Self Organizing Maps and explain how neighborhood function affects the map formation.	BTL-3	Applying	CO 2
14.	Analyze how feature maps are formed in SOMs. Discuss their role in unsupervised learning and dimensionality reduction.	BTL-3	Applying	CO 2
15.	Evaluate the effectiveness of the delta rule and Hebb rule in training neural networks. Which performs better under which conditions?	BTL-4	Analyzing	CO 2
16.	Compare backpropagation and Hebbian learning in terms of convergence speed, error reduction, and practical use cases.	BTL3	Applying	CO 2
17.	Critically evaluate LVQ in terms of its training phases, advantages, and limitations for classification tasks.	BTL5	Evaluating	CO 2
18.	Create a neural network architecture using backpropagation to classify handwritten digits. Explain architecture, activation, training, and evaluation.	BTL6	Creating	CO 2

UNIT – III MACHINE LEARNING – FUNDAMENTALS & FEATURE SELECTIONS & CLASSIFICATIONS

Classifying Samples: The confusion matrix, Accuracy, Precision, Recall, F1- Score, the curse of dimensionality, training, testing, validation, cross validation, overfitting, under-fitting the data, early stopping, regularization, bias and variance. Feature Selection, normalization, dimensionality reduction, Classifiers: KNN, SVM, Decision trees, Naïve Bayes, Binary classification, multi class classification, clustering.

Q.No.	Question	Bloom's Taxonomy Level	Competence	Course Outcome
	PART – A			
1.	How does feature selection help improve model accuracy?	BTL-2	Understanding	CO 3
2.	Distinguish between training, testing, and validation datasets.	BTL-2	Understanding	CO 3
3.	Compare KNN and SVM in terms of learning approach.	BTL-2	Understanding	CO 3
4.	What is a confusion matrix?	BTL-1	Remembering	CO 3
5.	How does a decision tree classify a given dataset?	BTL-2	Understanding	CO 3
6.	Differentiate between binary and multiclass classification with examples.	BTL-1	Remembering	CO 3
7.	Explain the purpose of clustering in unsupervised learning.	BTL-1	Remembering	CO 3
8.	Explain the concept of normalization in data preprocessing.	BTL-1	Remembering	CO 3
9.	Define accuracy in the context of classification.	BTL-2	Understanding	CO 3
10.	Illustrate the relationship between bias and variance in model generalization.	BTL-1	Remembering	CO 3
11.	What is precision in machine learning classification?	BTL-2	Understanding	CO 3
12.	What is the impact of high bias on model learning?	BTL-1	Remembering	CO 3

13.	Write the formula for F1-score.	BTL-2	Understanding	CO 3
14.	Why is cross-validation preferred over simple train-test split?	BTL-1	Remembering	CO 3
15.	Define recall in classification metrics.	BTL-2	Understanding	CO 3
16.	State the role of regularization in machine learning.	BTL-1	Remembering	CO 3
17.	List any two dimensionality reduction techniques.	BTL-1	Remembering	CO 3
18.	What do you mean by 'curse of dimensionality'?	BTL-2	Understanding	CO 3
19.	Describe how F1-score balances precision and recall.	BTL-1	Remembering	CO 3
20.	What is the purpose of a validation dataset?	BTL-2	Understanding	CO 3
21.	Explain how underfitting affects model performance.	BTL-1	Remembering	CO 3
22.	What is early stopping in training a model?	BTL-2	Understanding	CO 3
23.	Name any two supervised learning classifiers.	BTL-1	Remembering	CO 3
24.	Explain the difference between precision and recall with an example.	BTL-1	Remembering	CO 3
25.	Define overfitting.	BTL-2	Understanding	CO 3
	PART –B			
1.	(i) Discuss the Bias-Variance trade off. (ii) Discuss overfitting and underfitting with an example.	BTL-3	Applying	CO 3
2.	Explain the curse of dimensionality with examples. How does it affect machine learning model performance?	BTL-2	Understanding	CO 3
3.	Explain bias and variance in machine learning. Use diagrams to illustrate the trade-off between them.	BTL-2	Understanding	CO 3
4.	Describe the process and significance of normalization and feature scaling in data preprocessing.	BTL-2	Understanding	CO 3
5.	Compare binary classification and multiclass classification with real-world examples and algorithm suitability.	BTL-2	Understanding	CO 3
6.	Apply cross-validation techniques to improve model performance. Describe K-Fold and Leave-One-Out strategies with examples.	BTL-3	Applying	CO 3
7.	Illustrate the differences between overfitting and underfitting with graphs. What techniques are used to avoid them?	BTL-2	Understanding	CO 3
8.	Analyze the performance of a classifier using confusion matrix, accuracy, precision, recall, and F1-score. Provide a dataset and manually compute each metric.	BTL-4	Analyzing	CO 3
9.	How can early stopping and regularization be used to prevent overfitting in neural networks or other models?	BTL-3	Applying	CO 3
10.	Apply dimensionality reduction using PCA on a dataset with 100 features. Explain step-by-step how this helps model performance.	BTL-3	Applying	CO 3
11.	Design a classification system for spam email detection using Naïve Bayes. Explain assumptions, model building, and evaluation.	BTL-3	Applying	CO 3

12.	Analyze the decision-making flow of a decision tree classifier using a dataset. Explain entropy, information gain, and splitting criteria.	BTL-5	Evaluating	CO 3
13.	Critically evaluate the pros and cons of SVM over Decision Trees in binary classification problems.	BTL-4	Analyzing	CO 3
14.	Discuss the importance of training, testing, and validation datasets in building robust machine learning models.	BTL4	Analyzing	CO 3
15.	Compare and analyze KNN and SVM classifiers in terms of performance, complexity, and suitability for different types of datasets.	BTL-5	Evaluating	CO 3
16.	Evaluate different feature selection techniques. Compare filter, wrapper, and embedded methods with examples.	BTL3	Applying	CO 3
17.	Define and explain the terms accuracy, precision, recall, and F1-score with a labeled confusion matrix and numerical example.	BTL2	Understanding	CO 3
18.	Design a classification pipeline using preprocessing, feature selection, and a suitable classifier. Use a dataset of your choice and explain each stage.	BTL6	Creating	CO 3

UNIT – IV DEEP LEARNING: CONVOLUTIONAL NEURAL NETWORKS

Feed forward networks, Activation functions, back propagation in CNN, optimizers, batch normalization, convolution layers, pooling layers, fully connected layers, dropout, Examples of CNNs.

Q.No.	Question	Bloom's Taxonomy Level	Competence	Course Outcome
	PART – A			
1.	What are sparse interactions in a convolutional neural network?	BTL-1	Remembering	CO 4
2.	Present an outline of pooling layer in convolutional neural network.	BTL-1	Remembering	CO 4
3.	"The output layer of convolutional network is usually relatively inexpensive to learning layer". Justify.	BTL-5	Evaluate	CO 4
4.	Create a chart that demonstrates convolution with a stride.	BTL-6	Create	CO 4
5.	What is meant by convolution?	BTL-1	Remembering	CO 4
6.	Define primary visual cortex.	BTL-3	Applying	CO 4
7.	Define feature map.	BTL-1	Remembering	CO 4
8.	How pooling handles inputs of varying size?	BTL-2	Understanding	CO 4
9.	List three stages of a convolutional network.	BTL-2	Understanding	CO 4
10.	List out various formats of data that can be used with convolutional networks.	BTL-2	Understanding	CO 4
11.	Show three basic strategies for obtaining convolution kernels without supervised training.	BTL-3	Apply	CO 4
12.	Name two commonly used activation functions in CNNs.	BTL-2	Understanding	CO 4
13.	List any two optimizers used in training CNNs.	BTL-2	Understanding	CO 4
14.	What does dropout mean in neural networks?	BTL-2	Understanding	CO 4
15.	Give two examples of popular CNN architectures.	BTL-4	Analysing	CO 4
16.	Explain how the ReLU activation function works.	BTL-1	Remembering	CO 4
17.	Describe the role of backpropagation in CNN training.	BTL-3	Applying	CO 4

18.	What is the function of batch normalization in a CNN model?	BTL-1	Remembering	CO 4
19.	Compare max pooling and average pooling with examples.	BTL-2	Understanding	CO 4
20.	Explain how a fully connected layer works in a CNN.	BTL-2	Understanding	CO 4
21.	How do optimizers like Adam help in speeding up convergence?	BTL-1	Remembering	CO 4
22.	Why is dropout used, and how does it help prevent overfitting?	BTL-2	Understanding	CO 4
23.	Describe how a convolution operation is applied to an input image.	BTL1	Remembering	CO 4
24.	What is a forward pass in neural networks?	BTL2	Understanding	CO 4
25.	Define an activation function.	BTL2	Understanding	CO 4
	PART –B			
1.	Explain the operations of deep feed forward network with a diagram.	BTL3	Applying	CO 4
2.	What is a convolutional neural network? Outline transposed and dilated convolutions with an example.	BTL5	Evaluating	CO 4
3.	How to introduce non-linearity in a convolutional neural network? Explain with an example.	BTL4	Analyzing	CO 4
4.	Discuss the various performance metrics to evaluate a deep learning model with an example.	BTL4	Analyzing	CO 4
5.	Write an expression for Unshared convolution with explanation and explain Tiled convolution.	BTL1	Remembering	CO 4
6.	i. Write short notes Max Pooling. ii. Explain Pooling with downsampling.	BTL3	Applying	CO 4
7.	Explain random or Unsupervised Features.	BTL3	Applying	CO 4
8.	Explain the concept of forward propagation in a convolutional neural network with an example.	BTL3	Applying	CO 4
9.	Apply the backpropagation algorithm to update weights in a simple CNN. Use appropriate equations and explain gradient flow.	BTL4	Analyzing	CO 4
10.	Explain the operation of a convolution layer with a 2D image and 3×3 filter. Illustrate how the feature map is formed.	BTL3	Applying	CO 4
11.	Build a CNN architecture for image classification and describe the function of each layer. Include input shape, filters, strides, and activation.	BTL3	Applying	CO 4
12.	Analyze the importance of using different activation functions in deep neural networks. How do they affect vanishing gradients and convergence?	BTL3	Applying	CO 4

13.	Evaluate the performance of a CNN with and without batch normalization and dropout. How do these affect overfitting and training time?	BTL5	Evaluating	CO 4
14.	Compare optimizers like SGD, Adam, and RMSProp in terms of convergence rate, accuracy, and suitability for CNNs.	BTL4	Analyzing	CO 4
15.	Design a CNN architecture for digit recognition using the MNIST dataset. Justify your choice of layers, kernel sizes, and training strategy.	BTL5	Evaluating	CO 4
16.	Define and explain the role of activation functions in CNNs. Write short notes on Sigmoid, Tanh, and ReLU with graphs.	BTL2	Understanding	CO 4
17.	Create and explain the workflow of a custom CNN model using any framework (e.g., TensorFlow or PyTorch). Include data preprocessing, model building, training, and evaluation.	BTL5	Evaluating	CO 4
18.	Discuss strategies for hyperparameter tuning. Compare grid search, random search, and Bayesian optimization.	BTL1	Remembering	CO 4

UNIT – V DEEP LEARNING: RNNS, AUTOENCODERS AND GANS

State, Structure of RNN Cell, LSTM and GRU, Time distributed layers, Generating Text, Auto encoders: Convolutional Auto encoders, Denoising auto encoders, Variational auto encoders, GANs: The discriminator, generator, DCGANs.

Q.No.	Question	Bloom's Taxonomy Level	Competence	Course Outcome
	PART – A			
1.	Define Recurrent Neural Network.	BTL-1	Remembering	CO 5
2.	What is LSTM? How it differs from RNN?	BTL-1	Remembering	CO 5
3.	What is baseline model in deep learning?	BTL-2	Understanding	CO 5
4.	Define random search.	BTL-1	Remembering	CO 5
5.	What is regularized autoencoders?	BTL-1	Remembering	CO 5
6.	Define stochastic encoder.	BTL-2	Understanding	CO 5
7.	Explain the structure of RNN cell.	BTL-4	Analyzing	CO 5
8.	What is Bidirectional Recurrent Neural Networks?	BTL-2	Understanding	CO 5
9.	Explain the concept of gated RNNs.	BTL-2	Understanding	CO 5
10.	Give the advantage of recursive nets over recurrent nets.	BTL-2	Understanding	CO 5
11.	What is the advantage of introducing depth in Deep recurrent Networks?	BTL-1	Remembering	CO 5
12.	What are leaky units?	BTL-1	Remembering	CO 5
13.	What is Denoising Autoencoders?	BTL-1	Remembering	CO 5
14.	What the primary disadvantage of the non-parametric encoder?	BTL-2	Understanding	CO 5
15.	List out the trade-off faced in representation of learning problems.	BTL-1	Remembering	CO 5
16.	Give major advantage of slow feature analysis.	BTL-2	Understanding	CO 5
17.	Distinguish between one-shot learning and zero-shot learning.	BTL-1	Remembering	CO 5
18.	"Slow Feature Analysis is an efficient application of slowness principle", Justify.	BTL-5	Evaluate	CO 5

19.	How many task does the learner must perform in transfer learning?	BTL-2	Understanding	CO 5
20.	List the main components of an LSTM cell.	BTL-2	Understanding	CO 5
21.	What does DCGAN stand for in deep learning?	BTL-2	Understanding	CO 5
22.	Explain how a GRU differs from a standard RNN cell.	BTL-2	Understanding	CO 5
23.	Compare convolutional autoencoders with standard autoencoders.	BTL-1	Remembering	CO 5
24.	Describe the function of time-distributed layers in sequence modeling.	BTL-2	Understanding	CO 5
25.	Explain the interplay between generator and discriminator in GAN training.	BTL-1	Remembering	CO 5
	PART –B			
1.	What is a bi-directional recurrent neural network? Explain the architecture of a bi-directional recurrent neural network with a diagram.	BTL-3	Applying	CO 5
2.	What is long short term memory? Compare and contrast LSTM and gated recurrent units.	BTL2	Understanding	CO 5
3.	Justify your answer, that how autoencoders are suitable compared to PCA for dimensionality reduction	BTL-3	Applying	CO 5
4.	What is a generative adversarial network? Explain the architecture of a generative adversarial network with a diagram.	BTL-4	Analyzing	CO 5
5.	Describe the following. i. Long Short-Term Memory. (7) ii. Other Gated RNNs. (6)	BTL-2	Understanding	CO 5
6.	Explain challenge of Long-Term Dependencies.	BTL-4	Analyzing	CO 5
7.	Explain how to compute the gradient in a Recurrent Neural Network.	BTL-4	Analyzing	CO 5
8.	Describe the following i. Probabilistic PCA and. (6) ii. Factor Analysis. (7)	BTL-3	Applying	CO 5
9.	Apply LSTM to a text generation problem. Explain preprocessing, model structure, training strategy, and output generation.	BTL-3	Applying	CO 5
10.	Construct a denoising autoencoder and explain how it reconstructs clean images from noisy inputs. Include architectural and loss function details.	BTL-3	Applying	CO 5
11.	Analyze the architectural differences between convolutional autoencoders and fully connected autoencoders. Compare their applications in image processing.	BTL-3	Applying	CO 5
12.	Compare the encoder-decoder structure in variational autoencoders and standard autoencoders. How does probabilistic sampling work in VAEs?	BTL-5	Evaluating	CO 5

13.	Design a convolutional autoencoder for image compression. Justify the number of layers, kernel size, and activation functions used.	BTL-3	Applying	CO 5
14.	Create a DCGAN architecture for generating handwritten digits. Explain the design of both generator and discriminator networks along with training flow.	BTL-4	Analyzing	CO 5
15.	Explain the differences between RNN, LSTM, and GRU in terms of architecture, memory retention, and vanishing gradient problem.	BTL-2	Understanding	CO 5
16.	Describe the role and working of time-distributed layers in sequence modeling. How do they help with input/output sequence alignment?	BTL-2	Understanding	CO 5
17.	Define and explain the structure of a basic RNN cell, LSTM cell, and GRU cell with diagrams.	BTL-1	Remembering	CO 5
18.	Evaluate the training challenges in GANs, such as mode collapse and non-convergence. Suggest solutions and improvements to stabilize GAN training.	BTL5	Evaluating	CO 5

****