**Section – A (1 marks 20 question)**

**1. What is the basic building block of an Artificial Neural Network (ANN)?**

a) Neuron b) Weights c) Activation Function d) Layer

2. **Which of the following is not a commonly used activation function in neural networks?**

a) ReLU b) Sigmoid c) Tanh d) Logistic

3. **In the context of neural networks, what does "MLP" stand for?**

a) Multi-Level Perceptron b) Multi-Layered Perceptron

c) Maximum Likelihood Principle d) Minimum Loss Probability

4. **Which library in Python provides tools for building neural networks, including Multi-Layered Perceptrons (MLPs)?**

a) TensorFlow b) PyTorch c) Keras d) scikit-learn

5. **Which evaluation metric is commonly used for classification problems and measures the proportion of true positive predictions?**

a) Accuracy b) Precision c) Recall d) F1 Score

6. **What is the main objective of Unsupervised Learning algorithms?**

a) Predicting output labels b) Minimizing error

c) Discovering patterns in data d) Maximizing accuracy

7. **Which clustering algorithm aims to partition data into K clusters where each observation belongs to the cluster with the nearest mean?**

a) K-Nearest Neighbors b) K-Means Clustering c) Hierarchical Clustering d) DBSCAN

8. **In K-Means Clustering, what does "K" represent?**

a) Number of dimensions b) Number of clusters c) Number of features d) Number of iterations

9. **What is the purpose of Principal Component Analysis (PCA) in machine learning?**

a) To reduce overfitting b) To increase model complexity

c) To visualize data d) To perform dimensionality reduction

10. **Which evaluation metric is used to measure the effectiveness of dimensionality reduction techniques such as PCA?**

a) Mean Squared Error b) Variance Ratio c) Silhouette Score d) Adjusted Rand Index

11. **Which of the following is NOT a step involved in implementing PCA in scikit-learn?**

a) Standardization of features b) Fitting the PCA model

c) Selecting the number of components d) Training a neural network

12. **Which technique is commonly used to visualize reduced dimensions after applying PCA?**

a) Scatter Plot b) Histogram c) Box Plot d) Heatmap

13. **What is the main benefit of using PCA for dimensionality reduction?**

a) Increases computational complexity b) Reduces the interpretability of data

c) Helps in visualization and understanding of data d) Increases the accuracy of models

**15. Which of the following is NOT a step involved in implementing PCA in scikit-learn?**

a) Standardization of features b) Fitting the PCA model

c) Selecting the number of components d) Training a neural network

**16. Which technique is commonly used to visualize reduced dimensions after applying PCA?**

a) Scatter Plot b) Histogram c) Box Plot d) Heatmap

18. **What is the primary objective of the K-Means clustering algorithm?**

a) Maximize within-cluster variance b) Minimize within-cluster variance

c) Maximize between-cluster variance d) Minimize between-cluster variance

19. **Which step of the K-Means algorithm involves randomly initializing cluster centroids?**

a) Assigning data points to clusters

b) Computing the mean of data points in each cluster

c) Calculating the distance between data points and centroids

d) Initializing cluster centroids

**20. How does the K-Means algorithm update cluster centroids in each iteration?**

a) By randomly selecting new centroids from the data points

b) By computing the mean of data points in each cluster

c) By assigning data points to the nearest centroid

d) By adjusting centroids based on a predefined step size

**Section – B(2 marks 15 questions)**

1. **What is the significance of the term "K" in K-Means clustering?**

a) Number of features in the dataset b) Number of iterations for convergence

c) Number of clusters to be formed d) Number of dimensions in the dataset

**2. Which evaluation metric is commonly used to determine the optimal number of clusters in K-Means clustering?**

a) Inertia b) Silhouette score c) Davies-Bouldin index d) Adjusted Rand index

**3. In K-Means clustering, what problem can occur due to sensitivity to initial centroid placement?**

a) Overfitting b) Underfitting c) Local optima d) Global optima

4. **What does the "Elbow Method" aim to determine in K-Means clustering?**

a) Optimal number of dimensions b) Optimal number of iterations

c) Optimal number of clusters d) Optimal learning rate

5. **Which of the following statements about K-Means clustering is true?**

a) It is sensitive to outliers. b) It guarantees convergence to the global optimum.

c) It performs well with non-linearly separable data.

d) It is computationally expensive for large datasets.

**6. What happens if the clusters in K-Means clustering have varying sizes and densities?**

a) It leads to a higher silhouette score.

b) It affects the accuracy of clustering.

c) It speeds up the convergence of the algorithm.

d) It has no impact on the clustering result.

7. **Which of the following scenarios is K-Means clustering suitable for?**

a) Image segmentation b) Anomaly detection c) Text classification d) Time series forecasting

**8. In an ANN, what is the purpose of the loss function during training?**

a) To initialize the weights of the network b) To measure the performance of the network

c) To introduce non-linearity into the network d) To define the architecture of the network

**9. What role does the learning rate play in training an ANN?**

a) It controls the non-linearity of the network b) It initializes the weights of the network

c) It adjusts the step size during weight updates d) It defines the number of layers in the network

**10. Which technique is commonly used to prevent overfitting in ANN?**

a) Dropout b) Gradient Descent c) Feature Scaling d) One-Hot Encoding

**11. What is the purpose of the activation function in the output layer of a regression neural network?**

a) To introduce non-linearity into the network b) To control the learning rate of the network

c) To normalize the output values d) To calculate the loss function of the network

**12. In PCA, what does the explained variance ratio represent?**

a) The percentage of variance explained by each principal component

b) The number of components retained after dimensionality reduction

c) The cumulative variance explained by all principal components

d) The total variance of the dataset before dimensionality reduction

**13. How does PCA help in data preprocessing?**

a) By reducing the number of features while preserving most of the variance

b) By normalizing the data to have zero mean and unit variance

c) By one-hot encoding categorical variables

d) By oversampling minority classes in imbalanced datasets

**14. Which of the following statements about PCA is true?**

a) PCA increases the interpretability of the dataset b) PCA is robust to outliers in the data

c) PCA performs feature extraction by combining original features

d) PCA is a supervised learning algorithm

**15. How is the optimal number of principal components determined in PCA?**

a) By selecting the number of components that explain a certain percentage of variance

b) By randomly choosing a number of components

c) By using the Elbow Method d) By performing grid search