SAMPLE PAPERS

DIPLOMA FIFTH SEMESTER EXAMINATION 2025 (JUT)

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

DIPLOMA WALLAH

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Full Marks: 70 marks | Time: 3 Hours

Instructions:

- Question No. 1 is compulsory.

- Answer any **FOUR** questions from the remaining (Q.2 to Q. 7 marks).

Q.1 Multiple Choice Questions (Compulsory)

1. What is the output of a single neuron without any activation function?

a) Binary (0 or 1)

b) Linear

c) Exponential

d) Zero

2. Which command is used to initialize a new Git repository?

a) git start

b) git boot

c) git init

d) git new

3. Amazon AWS EC2 is primarily an example of which cloud service model?

a) SaaS

b) PaaS

c) IaaS

d) DaaS

4. In a confusion matrix, what do we call a negative instance that is correctly classified as negative?

a) True Positive

b) False Positive

c) True Negative

d) False Negative

5. Which classification algorithm is based on the application of Bayes' theorem?

a) K-Nearest Neighbors

b) Naive Bayes

c) Decision Tree

d) Linear Regression

6. "Bagging" is a technique primarily used in which algorithm?

a) Linear Regression

b) Random Forest

c) K-Means

d) SVM

7. In the context of Big Data, 'Veracity' refers to:

a) Speed of data

b) Volume of data

c) Trustworthiness/Quality of data

d) Variety of data

Q.2

A) Explain the K-Means Clustering algorithm. How do we decide the number of clusters (K)? [7 Marks]

B) What is Docker? Explain its architecture and why containers are used in AI deployment. [7 Marks]

Q.3

A) Discuss the ethical challenges in AI like Bias, Privacy, and Job displacement. [7 Marks]

B) Write a short note on Ensemble Learning (Bagging and Boosting). Why are they better than single models? [7 Marks]

Q.4

A) State Bayes' Theorem and explain its application in Naive Bayes Classification. [7 Marks]

B) What is Dimensionality Reduction? Explain PCA (Principal Component Analysis). [7 Marks]

Q.5

A) What does TF-IDF mean in NLP? Explain its importance. [7 Marks]

B) Briefly explain the concept of Eigenvalues and Eigenvectors and their use in AI. [7 Marks]

Q.6

A) What are the challenges in integrating data from different sources (Data Integration)? [7 Marks]

B) Briefly explain Backpropagation and how a Neural Network "learns" by updating weights.
[7 Marks]

Q.7 Short Notes

(Answer any FOUR. 4 × 3.5 Marks = 14 Marks)

A) MLOps (Need in Industry)

B) Support Vector Machine (SVM) & Hyperplane

C) Null Hypothesis vs P-value

D) Difference between Histogram and Scatter Plot

E) Version Control System (Git & GitHub)

SOLUTIONS & ANSWER KEY (PAPER 2)

MCQ Key:

1-(b), 2-(c), 3-(c), 4-(c), 5-(b), 6-(b), 7-(c)

Model Answers (Hints):

- **2A (K-Means):** Iterative algorithm, assigns points to nearest centroid, updates centroid. 'K' decided using Elbow Method.

- **3B (Ensemble):** Bagging (Bootstrap Aggregating, e.g., Random Forest) reduces variance. Boosting (e.g., AdaBoost) reduces bias. Better accuracy than single models.

- **6B (Backpropagation):** Calculates gradient of loss function, moves backward from output to input, updates weights to minimize error.