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. Which evaluation metric is defined as True Positives divided by (True Positives + False Positives)?

a) Recall

b) Accuracy

c) Precision

d) F1-Score

2. What is the main purpose of "Pruning" in Decision Trees?

a) To increase the depth

b) To prevent overfitting

c) To increase computational time

d) To handle missing values

3. Which type of learning involves an agent, an environment, and a reward system?

a) Supervised Learning

b) Unsupervised Learning

c) Reinforcement Learning

d) Semi-supervised Learning

4. "DataFrame" is a core data structure of which Python library?

a) NumPy

b) Pandas

c) TensorFlow

d) Keras

5. Which Git command shows the current status of the working tree (staged/unstaged files)?

a) git log

b) git config

c) git show

d) git status

6. SaaS stands for:

a) System as a Service

b) Software as a Service

c) Storage as a Service

d) Security as a Service

7. Which algorithm is a type of Unsupervised Learning?

a) Logistic Regression

b) Support Vector Machine

c) K-Means Clustering

d) Random Forest

Q.2

A) Differentiate between AI, Machine Learning, and Deep Learning with a diagram. [7 Marks]

B) Explain the 5 Vs of Big Data (Volume, Velocity, Variety, Veracity, Value). [7 Marks]

Q.3

A) Explain Activation Functions. Draw and define Sigmoid, ReLU, and Tanh. [7 Marks]

B) Explain the Machine Learning Workflow (Data Collection → Preprocessing → Training → Deployment). [7 Marks]

Q.4

A) Explain Linear Regression. What are its assumptions? [7 Marks]

B) Explain the architecture of an Artificial Neural Network (ANN) and how it differs from biological neurons. [7 Marks]

Q.5

A) Explain the steps of text processing in NLP: Tokenization, Stemming, Lemmatization, and Stop Word Removal. [7 Marks]

B) Discuss Cloud Computing in AI and the difference between IaaS, PaaS, and SaaS. [7 Marks]

Q.6

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

B) Explain the Confusion Matrix and how to calculate Accuracy, Precision, Recall, and F1-Score. [7 Marks]

Q.7 Short Notes

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

A) Pruning in Decision Trees

B) K-Means Clustering (Basic Concept)

C) Sentiment Analysis

D) Git and GitHub (Importance)

E) Supervised Learning vs Unsupervised Learning

SOLUTIONS & ANSWER KEY (PAPER 3)

MCQ Key:

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

Model Answers (Hints):

- **2A (AI vs ML vs DL):** AI is the broad umbrella; ML is a subset (learning from data); DL is a subset of ML (neural networks). Diagram: Concentric circles.
- **3A (Activation Functions):** Sigmoid (S-curve, 0 to 1), ReLU (Linear for positive, 0 for negative), Tanh (S-curve, -1 to 1).
- **4A (Linear Regression Assumptions):** Linearity, Independence, Homoscedasticity, Normality of error distribution.