Name of the Course and semester: BCA 6 Sem
Name of the Paper: *Fundamentals of Machine Learning*
Paper Code: TBC 603
Time: 1.5-hour
Maximum Marks: 50

Note:
(i) Answer all the questions by choosing any one of the sub questions
(ii) Each question carries 10 marks.
(iii) Please specify COs against each question.

Q1. (10 Marks)

a. Define and explain the following concepts with appropriate examples: CO1
   i. Mean, Median, and Mode.
   ii. Outliers and how to detect them in a dataset.

OR

b. Define the following Python data types with examples:

   i. Integer
   ii. Float
   iii. String
   iv. List
   v. Dictionary

Also, explain how variables are assigned in Python. CO2, CO1

Q2. (10 Marks)

a. Given the following two matrices, compute the following: CO2

$$A = \begin{pmatrix} 3 & 2 \\ 1 & 4 \end{pmatrix}, \quad B = \begin{pmatrix} 2 & 1 \\ 3 & 5 \end{pmatrix}$$

- Compute the matrix multiplication A×B.
- Find the inverse of matrix AAA, if it exists.

OR

b. What is operator precedence in Python? How does it affect the evaluation of expressions? Provide an example. Explain the different types of operators in Python with examples:
   i. Arithmetic Operators
   ii. Relational Operators
   iii. Logical Operators CO1

Q3. (10 Marks)

a. What is Machine Learning? Discuss its significance and briefly explain the three main approaches of Machine Learning: CO2
   i. Supervised Learning
   ii. Unsupervised Learning
   iii. Reinforcement Learning.

OR

b. Define a function in Python. Write a Python function to calculate the factorial of a number using recursion. Explain what a module is in Python. How do you import and use a module in a Python script? Provide an example using the **math** module. CO2

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Q4. (10 Marks)

a. The ages (in years) of five students are as follows: 16, 17, 17, 18, 19.
   i. Find the Mean, Median, and Mode of the dataset.
   ii. Identify if there are any outliers in this data. CO1

OR

b. Describe the process of file handling in Python. Write a Python program that creates a file named 'example.txt', writes some text into it, and then reads the content of the file. CO1, CO2

Q5. (10 Marks)

a. Illustrate challenges faced with computer vision and natural language processing. How do these subfields of ML contribute to developing intelligent systems? CO1

OR

b. A dataset contains the following values for the hours studied and the corresponding scores in an exam:
   Hours:1,2,3,4,5,6 Scores: 50, 55, 60, 65, 70, 75

   Using linear regression, calculate the coefficients (slope and intercept) of the regression line that predicts the score based on the number of hours studied.