

**Manipal School of Information Sciences (MSIS), MAHE, Manipal**

**I Semester ME (Big Data Analytics)  
BDA 5153 Fundamentals of Machine Learning lab**

**Lab Test**

**Date: 9<sup>th</sup> October 2023**

**Time: 2.30 – 4.00 p.m.**

**Answer All the Questions**

**CO 1**

Use build-in function in NumPy and Pandas to do the following

1. Find the dot product of  $a = ((0, 1)(1,1))$  and  $b = ((4, 1)(2, 1))$  (2 marks)
2. An array  $a = (4, -3, -2, 1, 3, 4)$ .
  - Find sum of the elements in the array (2 marks)
  - Find the small and big elements of the array (2 marks)
  - Find the mean and standard deviation of the array elements (2 marks)
  - Find the index of the biggest and smallest elements of the array (2 marks)
3. Create an array contain numbers from 0 to 35
  - make it as 6x6 matrix (2 marks)
  - find elements of 3rd row 3rd to 5th column (2 marks)
  - find all elements of 1st and 2nd row except last column (2 marks)
  - print rows in the reverse order (2 marks)
4. Find the time taken to execute the code that generates 25000 random numbers between 0 and 5000 and repeat this 100 times. (4 marks)
5. Write a Python code for the following: (8 marks) CO2

Consider the hypothesis space  $H$  defined by conjunctions of literals based on  $n$  boolean variables. The size  $|H|$  of this hypothesis space is  $3^n$ . If a learner attempts to learn a target concept described by conjunctions of up to **10 boolean literals**, and we desire a 95% probability that it will learn a hypothesis with error less than 0.1, then it suffices to present  $m$  randomly drawn training examples. Find the value of  $m$  sufficient for this case. Given  $[\delta = 5\% (0.05); \epsilon = 0.1]$