BITS Pilani
Pilani | Dubai | Goa | Hyderabad

Work Integrated Learning Programmes Division

M.Tech (Data Science and Engineering)

DSECLZC416 - Mathematical Foundations for Data Science

INSTRUCTONS

1. **Assignments have to be handwritten, images to be captured in a doc file. Convert the doc file to a pdf file and name it as your BITSID.pdf and upload the file**
2. **Assignments sent via email would not be accepted**
3. **Submissions beyond 17th of August, 17.00 hrs would not be graded.**

Assignment 2 - Total Marks – 10

Problem 1: Write a code in Python for Naïve and Warshall's algorithm for finding the transitive closure for the given relation. Use random matrices of order 10 to 100 and compare the time taken by Naïve method and Warshall's Algorithm. Show the log log plot of the time taken and determine the order

(5 Marks)

Problem 2: Prove that if m and n are positive integers and x is a real number then

$$\left\lfloor \frac{\lfloor x \rfloor + n}{m} \right\rfloor = \left\lfloor \frac{x+n}{m} \right\rfloor$$

(2 Marks)

Problem 3: Derive the volume of greatest rectangular parallelepiped that can be inscribed in an ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

(2 Marks)

Problem 4: Prove that if $A \subseteq B$ and $C \subseteq D$, then $(A \cup C) \subseteq (B \cup D)$ and $(A \cap C) \subseteq (B \cap D)$

(1 Mark)