MA 203
Tutorial 1
Introduction to MATLAB

1 Understanding the User Interface

- Overview of the user interface: Workspace, Editor, and Command Window
- Key functions: Running scripts, setting breakpoints, and pausing execution
- Steps to create, save, and execute a new script.
- Methods to clear the workspace and command window
- Adding comments and save the workspace

2 Types of variables

- Defining Variables: How to define specific variables (e.g., numeric character)
- Assigning Values to the variables
- Viewing Variables in Workspace: Understanding how values are stored
- Access the value of the variable using indexing Size() and length() functions can be shown

3 Basic arithmetic operations on variables

- Addition/subtraction/multiplication/division of scalar variable
- Addition/subtraction of matrices
- Operations on single element of the array
- Operations on single row of the array/matrix

- Operations on single column of the array/matrix
- Matrix multiplication and division using `inv()` function

4 Loops

- Why loops?
- Logical expressions (`<, <=, >, >=, ==`)
- Usage of `For` and `While` loops

5 Functions

- Why Functions?
- How to define a Function (format)
- Using the Function in the main code

6 Visualization and Post Processing

Explain the following commands with basic features:

`plot(x,y)` `contour(x,y,z)` `semilogx(x,y)` `semilogy(x,y)`

7 Practice Problems

7.1 Fibonacci Sequence Generation

The **Fibonacci sequence** is given by numbers $0, 1, 1, 2, 3, 5, 8, 13, ...$, here each term is the sum of the two preceding ones. Mathematically, it is defined as:

$$F(n) = \begin{cases} 0, & \text{if } n = 1 \\ 1, & \text{if } n = 2 \\ F(n-1) + F(n-2), & \text{if } n \geq 3 \end{cases}$$

Question:

- Ask the user to input the number of Fibonacci terms N.
- Using the given formula, generate the first N terms of Fibonacci sequence and display them.

7.2 Finding smallest number

Find the smallest number in a set using loops

- Declare the set of numbers from the user (a = [12 5 90 3 4 6 -16 25 90 50 500 235]).
- Use For and While loop to compare two numbers consecutively and find the smallest number in the set.

7.3 Finding factors

For the given set of numbers, find all the factors of each number and tabulate.

- Step 1. Declare the number set from the user defined input (a = [1 3 8 6 10 5 ...]).
- Step 2. Write a Function to find all the factors of a given number.
- Step 3. Use this function to get the factors for all the numbers in the set using a loop.
- Step 4. Print the results.