Dr. RamManohar Lohia Avadh University, Ayodhya U.P.
Study and Evaluation Scheme
MCA (Master of Computer Applications)
(Effective From Session 2020-21)
Year – I Semester – I

MCA 105 – PROGRAMMING WITH MATLAB

Course Details

- **Paper No.: V**

- **Course Code: MCA 105**

- **Course Title: PROGRAMMING WITH MATLAB (Theory)**

- **Marks Distribution: Internal = 50, External = 100, Total = 150**

🎯 **Goal**

1. **Integrate computation, visualization, and programming in an easy-to-use environment.**

2. **Provide a gentle introduction to MATLAB for beginners and as a review for existing users.**

Objectives:

- Learn basic MATLAB operations and environment

- Perform simple calculations and numerical computations

- Develop applications including GUI building

Outcomes:

- Understand MATLAB development environment and GUI

- Design simple algorithms to solve problems

- Write MATLAB programs for scientific and mathematical applications

- Utilize MATLAB toolboxes effectively

UNIT I — Introduction to MATLAB

- Features and basics of MATLAB

- MATLAB workspace and desktop

- Creating and running script M-files

- MATLAB as a calculator: Variables, Comments, Complex numbers

- Arithmetic operations: Scalars, Floating-point arithmetic, Built-in mathematical functions

- Commands for managing variables

- Relational and logical operations

- Applications in problem solving

UNIT II — Arrays, Matrices & Strings

- One-dimensional arrays: Addressing, Indexing, Manipulation, Sorting

- Multi-dimensional arrays: Construction, Manipulation, Built-in functions

- Matrix operations and manipulation

- Character strings: Construction, Manipulation, String functions

UNIT III — Control Flow & Functions

- Control structures: if, if-else, switch-case, for loop, while loop, nested loops, try-catch block

- Functions: Construction, Input-output arguments, Sub-functions, Nested functions

- Function handles and anonymous functions

- Command-line functions and using function files

UNIT IV — Graphics in MATLAB

- **2-D Graphics:** Basic plots, plot function, Style options, Multiple plots, Overlay plots, Specialized 2-D plots

- **3-D Graphics:** Line plots, Mesh plots, Surface plots, Contour plots, Changing viewpoints, Specialized 3-D plots

UNIT V — Applications of MATLAB

- **Linear Algebra:** Solving linear systems, Eigenvalues & Eigenvectors

- **Polynomials:** Roots, Addition, Multiplication, Division, Curve fitting

- **Data Analysis:** Differentiation, Integration, Solving differential equations