

# Python for Mathematics

**Course Code** MM18307DCE  
**Semester:** M.A./M. Sc 3<sup>rd</sup> Semester  
**Continuous Assessment: 20 Theory: 80**

**Total Credits: 04**  
**Total Marks:100**  
**Time Duration:2 ½ hours**

**Course Objectives:** To enable the students to write basic programs in Python and to implement some fundamental mathematical algorithms with a view to experiment with different mathematical concepts both graphically, symbolically and numerically .

**Course Outcomes:** After the completion of the course, the students will learn the basic syntax of Python, explore mathematically oriented algorithms, and delve into plotting and data structures and the basics of neural networks.

## **Unit I:**

Introduction to Python: History and Features. Setting up the Python Environment Variables, Data Types, and Operators, Control Structures: Conditional Statements and Loops. Functions and Modules, Lists, Tuples, and Dictionaries Sets, Trees and Graphs: Basic Concepts and Implementations, Python as the language of deep learning and AI.

## **Unit II:**

Functions: Defining a function, calling a function, Advantages of functions, types of function parameters, Formal parameters, Actual parameters, anonymous functions, global and local variables Modules: Importing module, Creating & exploring modules, Math module, Random module, Time module

File Input-Output: Opening and closing file, Various types of file modes, reading and writing to files, manipulating directories, Exception Handling: Introduction to Exception, Various keywords to handle exception try, catch, except, else, finally, raise-Regular Expressions-Concept of regular expression, various types of regular expressions.

## **Unit III:**

Plotting and Visualization: Introduction to Matplotlib and Seaborn. Plotting Basic Mathematical Functions, Visualizing Data: Histograms, Scatter Plots, and Box Plots, introduction to pandas and data analytics.

## **Unit IV:**

Introduction to Artificial Intelligence: Early Concepts and Developments in AI, Milestones in AI: From Symbolic AI to Machine Learning, Traditional and Ensemble Approaches for Decision making. Introduction to Neural Networks and Deep Learning,-

## **Recommended Books:**

1. Python for Data Analysis" by Wes McKinney
2. Python Programming for the Absolute Beginner" by Michael Dawson
3. Numerical Python: Scientific Computing and Data Science Applications with NumPy, SciPy and Matplotlib" by Robert Johansson
4. Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville
5. Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig
6. Artificial Intelligence: A Guide to Intelligent Systems by Michael Negnevitsky