AIT 324 DATA ANALYSIS WITH MATLAB 3 (2+1)

Objective(s)

Student shall be able to use an advanced mathematical, Statistics, Simulink, Curve Fitting Toolboxes and learn basics of MATLAB programming. The student shall be able to adapt an applied problem and use it with MATLAB.

UNIT I

Introduction

Basics of MATLAB: The basic features, MATLAB windows , A Few Elementary Calculations, Finding Help in Matlab, File types , General commands; Matrices and Vectors: Input, Indexing, Matrix manipulation, Creating vectors; Matrix and Array Operations: Arithmetic operations, Relational operations, Logical operations, Elementary math functions, Matrix Functions; Character Strings: Manipulating character strings, eval Function; Command- Line Functions: Inline functions, Anonymous functions; Built-in Functions, Plotting Simple Graphs

UNIT II

Programming Techniques

Programming in MATLAB: Script Files, Function Files, Language-specific Features: Global variables, Loops, branches, control-flow, Interactive input, Recursion; Advanced Data Objects: Multidimensional matrices, Structures, Cells; Handle graphics and user interface: Pre-defined dialogs, Handle graphics, Menu-driven programs

UNIT III

Applications

Linear Algebra, Curve Fitting and Interpolation, Data Analysis and Statistics, Ordinary Differential Equations, Numerical Integration, Nonlinear Algebraic Equations; Graphics: Basic 2-D Plots, Using subplot for Multiple Graphs, 3-D Plots, Saving and Printing Graphs

UNIT IV

Simulink and Curve Fitting Toolboxes

Introduction to Simulink and Curve Fitting, Getting Started using Simulink : Block Libraries, Wiring techniques, Help window, Configuration, Building a Simple Model; Getting Started with the Curve Fitting Toolbox : Curve Fitting Tools ,Interactive Curve Fitting , Programmatic Curve Fitting, Model Types for Curves

UNIT V

Statistics Toolbox

Data organization and management, Descriptive Statistics , Statistical plotting and data visualization, Probability Distributions, Linear and Nonlinear Models, Hypothesis Tests , Design of Experiments

Practical(s)

1. An overview of MATLAB software
2. Create and work with Arrays of Numbers
3. Create and Print Simple Plots
4. Create, Save, and Execute a Script File and Function File
5. Manipulate matrices and use them as matrices or arrays
6. Use Built- in Functions
7. Create and work with anonymous functions
8. Work with symbolic mathematics toolbox
9. Saving, loading, importing, and exporting data
10. Learn about file and directory navigation
11. Generate report from your MATLAB programs using publisher
12. Finding the determinant of a matrix , eigenvalues and eigenvectors
13. Linear Algebra : Solving a linear system, Gaussian elimination, Matrix factorizations
14. Curve Fitting and Interpolation
15. Data Analysis and Statistics
16. Ordinary Differential Equations
17. Nonlinear Algebraic Equations
18. SIMULINK

Reference Book(s)

1. Fausett L.V. (2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
2. Chapra S.C. and Canale R.P. (2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill
3. Hanselman, Duane. Little_eld, Bruce. Mastering Matlab (international edition). Pearson/Prentice Hall.
4. Rudra Pratap, Getting Started with Matlab (Indian edition) Oxford University Press