II B.Tech – I Semester
(20EE3201) MATLAB FOR ELECTRICAL ENGINEERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

Pre-Requisites: Linear Algebra & Vector Calculus

Course Objectives

- To outline the programming concepts using MATLAB.
- To illustrate various visualization tools in MATLAB.
- To solve complex algebraic equations using MATLAB
- To develop GUI for the electrical and electromechanical systems using SIMULINK
- To integrate SIMULINK with MATLAB

UNIT-I: Introduction to MATLAB Environment

Theory: Basics of Programming in MATLAB: Variables, array, matrices, programming structure, Script files-writing, saving and reading. Read from and write into MAT-files, Excel files, text files.

Practical:

1. Use MATLAB as a calculator to create variables (real numbers, characters, complex numbers and matrices) and perform arithmetic operation on such variables.
2. Generate a script file to read data from an excel sheet and write to an excel sheet. Also visualize the data with proper labels and legends.

UNIT-II: Visualization and Programming

Theory: Two and three dimensional graphics, multiple plots, Plot properties.

Practical:

1. Write a code to evaluate current and voltage in a circuit and visualize the data using plotting tools.
2. Write a code to visualize the effect of resistance, and frequency in an RLC series circuit.

UNIT-III: Solving Equations and Numerical Techniques

Theory: Functions, Loops, branches and control flow, Relational and logical operations, Linear Algebra, Differentiation/Integration, Differential Equations.

Practical:

1. Write a code to call a function repeatedly to evaluate for different values of a given parameter.
2. Write a code to solve a system of linear mesh equations of an electric network.
3. Write a code using functions to solve a system of non-linear equations equation using Newton-Raphson method.
4. Write to code to obtain the derivative of a function and plot the function and its derivatives

UNIT-IV: Modelling of Electrical systems in Simulink

Theory: Introduction to SIMULINK: models, blocks, Systems and sub-systems, Simulating Dynamic System, Solving a model, solvers.

Practical:

1. Develop a simulation model of RL series circuit and obtain voltage across and current through the individual elements for a given input voltage.
2. Develop a simulation model of RLC series circuit and obtain voltage across and current through the individual elements.

UNIT-V: MATLAB SIMULINK integration

Theory: Integrating MATLAB with SIMULINK

Practical:

1. Construct a DC motor model in Simulink and obtain speed response for different input voltages and changes in parameters.
2. Construct a DC motor model in Simulink and call the model from a script file to obtain speed response for different input voltages and parameters.
3. Construct a full bridge diode rectifier model in Simulink and obtain the total harmonic distortion of the output voltage.

Course Outcomes:

After successful completion of the course, the students will be able to:

S.No	Course Outcome	BTL
1.	Summarize the working environment in MATLAB	L2
2.	Select suitable visualization method for plotting given data	L1
3.	Solve integral-differential equations using MATLAB	L3
4.	Evaluate the response of electrical systems in MATLAB/ SIMULINK	L5
5.	Model electrical systems in MATLAB and interface with SIMULINK	L5

Correlation of COs with POs& PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	3	-	-	-	-	-	-	2	-	3
CO2	-	-	-	-	3	-	-	-	-	-	-	2	-	3
CO3	-	-	-	-	3	-	-	-	-	-	-	2	-	3
CO4	-	-	-	-	3	-	-	-	-	-	-	2	-	3
CO5	-	-	-	-	3	-	-	-	-	-	-	2	-	3

Text Books:

1. Marvin Marcus, Matrices and MATLAB: A Tutorial, Prentice Hall, 2010.
2. Joseph C. Musto, William E. Howard, Richard R. Williams, Engineering Computations: An Introduction Using MATLAB and Excel, McGraw-Hill,2021, 2nd edition

Reference Books:

1. https://in.mathworks.com/academia/courseware/teaching-calculus-with-matlab.html