DEPARTMENT OF MECHANICAL ENGINERING

COURSE MODULE

Faculty Name:	Academic Year: 2025-2026

Department: MECHANICAL ENGINEERING							

Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BME657A	Basics of Matlab	CORE	**Engineering Mathematics, C ++ Programming**	0	0	2	**12-14** Sessions

Objectives	**Course objectives:** • To know about fundamentals of MATLAB tool. • To provide an overview to program curve fitting & solve Linear and Nonlinear Equations. • To understand the concept and importance of Fourier transforms. • To gain knowledge about MATLAB Simulink & solve engineering problems.

SI. NO	Experiments
1	Introduction to MATLAB Programming: Basics of MATLAB Programming, array operations in MATLAB, loops and execution of control, working with files: Scripts and functions, plotting and programming output, examples.
2	
3	Numerical Methods and their applications: Curve Fitting: Straight line fit, Polynomial fit.
4	
5	Numerical Integration and Differentiation: Trapezoidal method, Simpson method.
6	
7	Linear and Nonlinear Equations: Eigen values, Eigen vectors, Solution of linear algebraic equations using Gauss Elimination and LU decomposition, Solution of nonlinear equation in single variable using Gauss-Siedal and Newton Raphson method.
8	
9	Ordinary Differential Equations: Introduction to ODE's, Euler's method, second order RungaKutta method, MATLAB ode45 algorithm in single variable and multivariable.
10	Transforms: Discrete Fourier Transforms
11	Application of MATLAB to analyse problems in basic engineering mechanics, mechanical vibrations, control system, statistics and dynamics of different circuits
12	MATLAB Simulink: Introduction to MATLAB Simulink, Simulink libraries, development of basic models in Simscape Power Systems

TEXT BOOKS:
1. Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", OXFORD Higher Education.

2. Dr. Shailendra Jain, "Modelling & Simulation using MATLAB – Simulink", Wiley – India

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List of Reference Books
1. Won Y.Tang, Wemun Cao, TaeSang Ching and John Morris, "Applied Numerical Methods Using MATLAB", A John Wiley & Sons. 2. Steven T. Karris, "Introduction to Simulink with Engineering Applications", Orchard Publications.

Course Outcomes	At the end of the course, the student will be able to 1. Implement loops, branching, control instruction and functions in MATLAB programming environment. 2. Programming for curve fitting, numerical differentiation and integration, solution of linear equations in MATLAB and solve engineering problems. 3. Understand implementation of ODE using ode 45 and execute Solutions of nonlinear equations and DFT in MATLAB.. 4. Simulate MATLAB Simulink examples.

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code:	BME657A		TITLE: Basics of Matlab			Faculty Name:								
Listof Course Outcomes	**ProgramOutcomes**													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	3	-	-	2	-	-	-	-	-	-	2	2	
CO-2	3	3	-	-	2	-	-	-	-	-	-	2	2	
CO-3	3	3	-	-	2	-	-	-	-	-	-	2	2	
CO-4	3	3	-	-	2	-		-	-	-	-	2	2	

Note: 3 =Strong Contribution   2=Average Contribution   1=Weak Contribution