GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering
Level: PG
Subject Code: ME03065021
Subject Name: MATLAB Applications in Civil Engineering

w. e. f. Academic Year:	2024-2025
Semester:	III
Category of the Course:	**Open Elective**

Prerequisite: **Programming language**

Rationale:	MATLAB is a versatile mathematical tool for solution of various Civil Engineering problems. Various mathematical models can be developed and numerical solutions of the problems can be solved using this tool.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Apply various MATLAB commands for problem solving	A, N
02	To manage data and apply for programming purpose using MATLAB	C, E
03	Program using MATLAB scripts and function	A, N
04	Solve numerical problems using MATLAB	A, U
05	Solve Civil Engineering problems using MATLAB	A, R

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	3	70	30	20	30	150

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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction: MATLAB Introduction, Symbolic Calculations, MATLAB installation and computer requirements, Basics of MATLAB	**4**	**15**
2.	Interactive Computation: 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, Creating and Using Inline Functions, Using Built-in Functions and On-line Help, Saving and Loading Data, Plotting simple graphs	**8**	**30**
3.	Programming in MATLAB: Scripts and Functions: Script Files, Function Files, executing a function, more on functions, Sub functions, Compiled (Parsed) functions: P-Code, The Profiler, Language-Specific Features, Global variables, Loops, branches, and control-flow, Interactive input, Recursion, Advanced Data Objects, Multidimensional matrices, Structures & Cells	**8**	**25**
4.	Linear Algebra, solving a linear system, Gaussian elimination, Finding eigen values & eigenvectors, Matrix factorizations, Curve Fitting and Interpolation, Polynomial curve fitting, Least squares curve fitting, Interpolation, Data Analysis and Statistics. Basic 2-D Plots, using subplot to Layout Multiple Graphs, 3-D Plots, Handle Graphics, Saving and Printing Graphs. Applications of MATLAB in Civil Engineering	**8**	**30**
	Total	**28**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	20	20	10

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. MATLAB: A Practical Introduction to Programming and Problem-Solving by Stormy Attaway
2. Beginning MATLAB and Simulink : From Beginner to Pro by Sulaymon Eshkabilov
3. MATLAB: An Introduction with Applications by Amos Gilat
4. MATLAB® and its Applications in Engineering, by Rajkumar Bansal, Ashokkumar Goel& Manoj Kumar Sharma
5. Soft Computing with MATLAB Programming by N.P. Padhy and S.P. Simon

(b) Open source software and website:

https://nptel.ac.in/courses/103106118
https://nptel.ac.in/courses/111102137

Suggested Course Practical List:

1. Introduction to MATLAB
2. Installation/set up the MATLAB
3. Programming in MATLAB
4. Curve fitting and other solutions to numerical method problems using MATLAB
5. Practical's on various applications of MATLAB in civil engineering
6. Iterative and transformations methods

List of Laboratory/Learning Resources Required:

MATLAB Software

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