

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

SreeSainath Nagar, Tirupati

Department of Civil Engineering

Supporting Document for 1.1.2

Syllabus Revision carried out in 2020

Program : B.Tech.-Civil Engineering

Regulations : SVEC-20

This document details the following:

- 1. Courses where syllabus has been changed 20% and more.
- 2. Course-wise revised syllabus with changes highlighted.

Note: For SVEC-20 revised syllabus, SVEC-19 (previous syllabus) is the reference.

S. No.	Course Code	Name of the course	Percentage of Syllabus changed	Page Number in which Details are Highlighted
1.	20BT20541	Programming in C and Data Structures	100	3
2.	20BT20551	Programming in C and Data Structures Lab	100	5
3.	20BT30131	Civil Engineering Materials and Construction Technology Lab	100	8
4.	20BT40134	Advanced Surveying Practice	100	11
5.	20BT50133	MATLAB Practice for Civil Engineers	100	13
		Average%(A)	100	
Total No. of Courses in the Program (T)			137	
No. of Courses where syllabus (more than 20%) has been changed(N)			05	
Perce	Percentage of syllabus content change in the courses $(C)=(A \times N)/100$]
Р	ercentage of	3.64		

List of Courses where syllabus has been changed (20% and more)

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PRINCIPAL SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS) Sree Salnath Nagar, A. RANGAMP Chittoor (Dist.) - 517 102, A.P., INDIA.

output, Formatted input and output functions. **Control Statements:** Specifying test condition for selection and iteration, Writing test expression, Conditional execution and selection, Iteration and repetitive execution, goto statement, Special control statements, Nested loops.

conversion in C.

UNIT-II: INPUT AND OUTPUT, CONTROL STATEMENTS (09 Periods) **Input and Output:** Basic screen and keyboard I/O in C, Non-formatted input and

Manipulation.

UNIT-I: INTRODUCTION TO C PROGRAMMING

Introduction to Algorithms and Flowcharts: What is an algorithm, Different ways of algorithms, Key features of algorithm, What are variables. stating Subroutines, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Basis of C Programming: Introduction, Structure of a C program, Concept of a

variable, Data types in C, Program statement, Declaration, Howdoes the computer store data in memory, Tokens, Operators and expressions, Expressions revisited, Type

DETAILED SYLLABUS:

Design algorithmic solutions by analyzing programming problems and using CO2.

Develop flowcharts, algorithms for given problems.

Stack; Queue; Searching algorithms; Sorting algorithms.

appropriate C language constructs. Apply linear data structures such as arrays, linked lists, stacks, queues for CO3.

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

COURSE DESCRIPTION: Algorithms; Flowcharts; Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures;

- efficient data organization and manipulation.

CO4 Select appropriate techniques for searching and sorting problems.

00.11	00.000	appropriate	

CO1.

Int. Marks Ext. Marks Total Marks L Т Ρ 30 70 100 3

PRE-REOUISITES: ACourse on Basic Mathematics

I B. Tech. – II Semester (20BT20541) PROGRAMMING IN C AND DATA STRUCTURES

(Common to CE, ME, EEE, ECE and EIE)

UNIT-III: ARRAYS AND STRINGS, FUNCTIONS (10 Periods) Arrays One-dimensional and Strings: Declaration, array Initialization, Manipulation; Multi-dimensional arrays _ Declaration, Initialization, Manipulation; Strings – Declaration, Initialization, String input/output, Character manipulation, String manipulation; Arrays of strings - Declaration, Initialization,

(08Periods)

С

3

4

Functions: Concept of function, Using functions, Call by value mechanism, Working with functions, Passing arrays to functions, Scope and extent, Storage classes, Recursion.

UNIT-IV: POINTERS, USER-DEFINED DATA TYPES, LINKED LISTS(10 Periods)

Pointers in C: Understanding memory addresses, Address operator (&), Pointer, Arrays and pointers, Pointers and strings, Pointer arithmetic, Pointers to pointers, Array of pointers, Pointers to an array, Two-dimensional arrays and pointers, Dynamic memory allocation.

User-Defined Data Types: Structures - Declaration, Initialization, Accessing members, Arrays of structures, Arrays within structure, Structures and pointers, Structures and functions; Enumeration types.

Linked Lists: Single linked lists – Definition, Representation, Operations, Inserting a node, Deleting a node; Applications of linked lists, Disadvantages of linked lists, Array versus linked list revisited.

UNIT- V: DATA STRUCTURES

Basic Data Structures: Overview of data structures, Stack – Definition, Array representation, Implementation of stack operations using arrays; Queue - Definition, Array Array representation, Implementation of queue operations using array.

Searching and Sorting: Linear Search, Binary Search, Bubble sort, Selection sort.

Total Periods: 45

(08 Periods)

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

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- 1. Pradip Dey and Manas Ghosh, *Programming in C*, Oxford University Press, 2018.
- 2. DebasisSamanta, *Classic Data Structures*, 2nd Edition, PHI Learning, 2009.

REFERENCE BOOKS:

- 1. Byron S Gottfried and Jitender Kumar Chhabra, *Programming with C*, 4thEdition, McGraw Hill Education, 2019.
- 2. YashavantKanetkar, *Let Us C*, 17thEdition, BPB Publications, 2020.

ADDITIONAL LEARNING RESOURCES:

- 1. E. Balagurusamy, *Programming in C*, 7thEdition, McGraw Hill, 2014.
- 2. R. G. Dromey, *How to Solve it by Computer*, Pearson Education, 2007.
- 3. https://nptel.ac.in/courses/106/104/106104128/
- 4. https://nptel.ac.in/courses/106/103/106103069/

<mark>I B. Tech. – II Semester</mark>

(20BT20551) PROGRAMMING IN C AND DATA STRUCTURES LAB

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	_	Т	Р	С
30	70	100	-	-	-	3	1.5

PRE-REQUISITES: A course on "Programming in C and Data Structures"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.

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

- CO1. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
- CO2. Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
- CO3. Select appropriate techniques for searching and sorting problems.
- CO4. Work independently and communicate effectively in oral and written forms.

LIST OF EXERCISES:

- a) _et a and b are two integer variables whose values are 10 and 13 respectively. *N*rite a program to evaluate the following arithmetic expressions.
 i) a + b
 ii) a b
 iii) a * b
 iv) a/b
 v) a % b
 - b) Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
 - i) (ax + b)/(ax b)

ii)
$$2.5 \log x + \cos 32^0 + |x^2 + y^2|$$

- iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$
- iv) ae^{kt}
- a) Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = PTR / 100)
 - b) A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
 - c) in a town, the percentage of men is 52. The percentage of total literacy is 48. If iotal percentage of literate men is 35 of the total population; write a program to ind the total number of illiterate men and women if the population of the town is 8000.

- 3. a) Write a program that prints the given three integers in ascending order using if-else.
 - b) Write a program to calculate commission for the input value of sales amount. Commission is calculated as per the following rules:
 - i) Commission is NIL for sales amount Rs. 5000.
 - ii) Commission is 2% for sales when sales amount is >Rs. 5000 and
 <= Rs. 10000.
 - iii) Commission is 5% for sales amount >Rs. 10000.
 - c) If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.
- 4. a) An insurance company calculates premium as follows:
 - i) If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.
 - ii) If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.
 - iii) If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.
 - iv) In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

- b) Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, %. Use switch statement)
- 5. a) Write a program to find the sum of individual digits of a positive integer.
 - b) A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.
- 6. a) Write a program to find the largest and smallest number in a given list of integers.
 - b) Write a program to perform addition of two matrices.
 - c) Write a program to determine whether the given string is palindrome or not.
- 7. a) Write a program using functions to perform the following operations:
 - i) To convert a given decimal number into binary number
 - ii) To convert a given binary number into decimal number
 - b) Write a program using functions insert a sub-string in main string at a specified position.

- 8. a) Write a C program to print the elements of an array in reverse order using pointers.
 - b) Write a program to accept the elements of the structure as: Employee-name, Basic pay. Display the same structure along with the DA, CCA and Gross salary for 5 employees.

Note: DA=51% of Basic pay, CCA=Rs.100consolidated.

- 9. A college has N number of students and the following details of all the students are maintained register number, name, branch, phone number. Write a program to store the details of the students using a singly linked list. Develop functions to perform the following operations on the data.
 - i) Insert new student's details
 - ii) Display the details of the students
 - iii) Delete a given student's information
- 10 a) Develop a menu driven program to perform the following operations on a stack of integers (Array implementation of stack with maximum size MAX)
 - i) Push an element
 - ii) Pop an element
 - iii) Display the status
 - iv) Demonstrate overflow and underflow situations
 - b) Develop a menu driven program to perform the following operations on a queue of characters (Array implementation of queue with maximum size MAX).
 - i) Insert an element
 - ii) Delete an element
 - iii) Display the status
 - iv) Demonstrate overflow and underflow situations
- 11 Store register numbers of students who attended placement training program in a random order in an array. Write a function to search whether a student has attended placement training program or not using
 - a) Linear Search
 - b) Binary Search
- 12 Given marks of N number of students in mathematics subject, write a program to display the marks of students in ascending order using
 - a) Bubble Sort
 - b) Selection Sort

TEXT BOOKS:

- 1. Pradip Dey and Manas Ghosh, *Programming in C*, Oxford University Press, 2018.
- 2. DebasisSamanta, *Classic Data Structures*, 2nd Edition, PHI Learning, 2009.

REFERENCE BOOKS:

- 1. Byron S Gottfried and Jitender Kumar Chhabra, *Programming with C*, 4th Edition, McGraw Hill Education, 2019.
- 2. YashavantKanetkar, *Let Us C*, 17thEdition, BPB Publications, 2020.

II B.Tech. – I Semester

(20BT30131) CIVIL ENGINEERING MATERIALS AND CONSTRUCTION TECHNOLOGY LAB

Int. Marks	Ext. Marks	Total Marks	L	Т	Ρ	С
30	70	100	-	-	2	1

PRE-REQUISITES: Course on Civil Engineering Materials and Concrete Technology.

COURSE DESCRIPTION: Experiments/Exercises on Civil Engineering Materials, Bricks, Timber, Tiles, Construction Equipment, Masonry, Bar Bending, Reinforcement, Painting, House wiring, Shuttering and Scaffolding.

COURSE EDUCATIONAL OBJECTIVES:

- CEO1 To impart the knowledge of identifying and characterizing civil engineering materials and construction techniques.
- CEO2 To develop analysis, design, problem solving, team work, communication, cost and resource management skills in solving civil engineering materials and construction technology problems, using appropriate tools and techniques.
- CEO3 To inculcate ethics and lifelong learning for promoting safe, sustainable and environment friendly civil engineering materials and construction techniques.
- **COURSE OUTCOMES:**After completion of this course, a successful student will be able to:
- CO1 Evaluate civil engineering materialsusing various tools and techniques to solve complex civil engineering material problemsby following relevant IS codes and latest developments ensuring cost effectiveness, safety, environment and sustainability.
- CO2 Analyzeconstruction techniquesto solve complex construction technology problemsby following current developments ensuring cost effectiveness, resource management, safety, environment and sustainability.
- CO3 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on civil engineering materials and construction technology.

LIST OF EXPERIMENTS/EXERCISES:

Part – I: CIVIL ENGINEERING MATERIALS

A. PROPERTIES AND IDENTIFICATION OF CIVIL ENGINEERING MATERIALS

- 1. Properties and identification of building materials
- 2. Market survey for building materials

B. TESTS ON BRICK

- 3. Visual inspection test for color, shape and size
- 4. Determination of soundness of brick
- 5. Water absorption test of brick
- 6. Efflorescence test of brick
- 7. Determination of compressive strength of brick

C. TESTS ON TIMBER

- 8. Identification of defects in timber
- 9. Determination of moisture content of timber
- 10. Determination of volumetric shrinkage of timber
- 11. Determination of density of timber

D. TESTS ON TILES

- 12. Determination of water absorption of vitrified tile
- 13. Determination of bulk density of vitrified tile
- 14. Determination of water absorption of cement concrete floor tile
- 15. Determination of flatness of cement concrete floor tile
- 16. Determination of abrasion resistance of vitrified/cement concrete floor tile
- 17. Determination of flexural strength of tile
- 18. Determination for compressive strength of paver block tile

PART- II: CONSTRUCTION TECHNOLOGY

A. INDENTIFICATION OF CONSTRUCTION EQUIPMENT

- 1. Specifications and identification of construction equipment
- 2. Market survey for construction equipment

B.MASONRY

- 3. Construction of masonry brick wall using English bond
- 4. Construction of masonry brick wall using Flemish bond
- 5. Plastering and pointing

C. BAR BENDING AND REINFORCEMENT

 Bar bending of reinforcement skeleton for foundations, columns, beams, slabs, lintels, arches, vaults and stair cases.

D. PAINTING

- 7. External wall painting
- 8. Internal wall painting

E. HOUSE WIRING

- <mark>9.16 A Line</mark>
- 10.6 A Line

F. SHUTTERING AND SCAFFOLDING

- 11. Shuttering for beams and slabs
- 12. Shuttering for columns and Walls
- 13. Steel scaffolding
- 14. Single and double scaffolding

REFERENCE BOOKS:

- 1. Duggal, S. K., *Building Materials*, New Age International Publishers, 4th Edition, 2012.
- Neville, A. M., Properties of Concrete, John Wiley and Sons, New Delhi, 5th Edition, 2011.

LABORATORY MANUALS:

1. Civil Engineering Materials and Construction Technology Manual (SVEC20 Regulations), Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

IS Codes:

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1.	IS 1708 (Part-3)	: Testing of Small Clear Specimen of Timber
2.	IS 3364 (Part-1 & 2) - 1976	: Evaluation of Defects in Timber
3.	IS 687 – 2008	: Tests for Bamboo
4.	IS 1237 – 2012	: Specifications for Cement concrete Floor Tiles
5.	IS 13630 (Part-2)- 2006	: Ceramic Tiles - Methods of Test, Sampling
6.	IS 15658 – 2006	: Precast Concrete Blocks for Paving
7.	IS 1077 - 1992	: Burnt Clay Building Brick
8.	IS 7293 – 1974	: Working with Construction Machinery
9.	IS 2212 – 1991	: Practice for Brick work
10.	IS 2502 – 1993	: Practice for Bar Bending and Fixing of Bars
11.	IS 2395 (Part-1) – 1994	: Practice for Painting Concrete
12.	IS 732 – 1989	: Practice for Electrical Wiring Installations
13.	IS 1467 - 1999	: Guidelines for False-work for Concrete Structures

IMPROVEMENTS OVER SVEC19 SYLLABUS:

- 1. Test related to Cement, Fine aggregate, Coarse Aggregates, Fresh and Hardened Concrete are shifted to Concrete Technology Lab.
- 2. Added Tests on wood and Tiles in Part-I
- 3. Added Exercise on Pointing and Plastering in Part II of Masonry.

II B.Tech. – II Semester

(20BT40134) ADVANCED SURVEYING PRACTICE

Int. Marks	Ext. Marks	Total Marks	L	Т	Ρ	С
30	70	100	-	1	2	2

PRE-REQUISITES: Course on Surveying.

COURSE DESCRIPTION: Exercises on:Total station surveying; Drone surveying.

COURSE EDUCATIONAL OBJECTIVES:

- CEO1 To impart the practical knowledge on total station surveying and drone surveying.
- CEO2 To develop analysis, design, problem solving, teamwork, communication skills in advanced surveying using total station, drone and appropriate techniques.
- CEO3 To inculcate ethics and lifelong learning in advanced surveying practice and report preparation by considering society, environment and sustainability.

COURSE OUTCOMES: After completion of this course, a successful student will be able to:

- CO1 Develop survey plots and 3D models using total station and appropriate software tools and techniques to solve complex surveying problems following ethics and latest developments considering society, environment and sustainability.
- CO2 Develop survey plots and 3D models using drone and appropriate software tools and techniques to solve complex surveying problems following ethics and latest developments considering society, environment and sustainability.
- CO3 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on advanced surveying practice.

LIST OF PRACTICAL EXERCISES:

PART – I: TOTAL STATION SURVEYING

- 1. Basic operations of total station centering, levelling, measuring distances, measuring angles.
- 2. Boundary survey and contour mapping in a layout using total station
- 3. Boundary survey data processing for preparation of the layout using AutoCAD
- 4. Generation of coordinates in AutoCAD for developing new plots within the establishedboundaries in the layout
- 5. Import the coordinates of the new plots generated to total station and marking them in the field
- 6. Measurement of areas and volumes using total station
- 7. Generation of 3D models of designed layouts using relevant software tools

PART- II: DRONE SURVEYING

1. Introduction to professional drone

- 2. Flying the professional drone in the field
- 3. Downloadingsurvey data from the drone
- 4. Geo-referencing the drone images

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- 5. Processing drone survey data to create orthomosaic maps (3D Maps) using data processing software tools
- 6. Determination of area using drone
- 7. Determination of volume using drone
- 8. Digital Surface Modeling (DSM) and Digital Terrain Modelling (DTM) using drone.
- 9. Infrastructure quality inspection using drone
- 10. Construction site monitoring using drone

REFERENCE BOOKS/LABORATORY MANUALS:

- 1. Advanced Surveying Practice Manual (SVEC20 Regulations), Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.
- 2. Satheesh,G., Sathikumar, R. and Madhu, N., *Advanced Surveying:Total Station, GPS, GIS & Remote Sensing*, Pearson, 2nd Edition, 2017.
- 3. Kike Calvo, So You Want to Create Maps Using Drones?, Blurb Publishers, 2015.
- 4. Armenakis, C. and Patias, P., *Unmanned Vehicle Systems for Geomatics: Towards Robotic Mapping*, Whittles Publishing, 2019.

IMPROVEMENTS OVER SVEC19 SYLLABUS:

1. New Course.

III B.Tech. – II Semester

(20BT50133)MATLAB PRACTICE FOR CIVIL ENGINEERS

(Civil Engineering)

Int. Marks	Ext. Marks	Total Marks	L	Т	Ρ	С
50	50	100	-	1	3	2

PRE-REQUISITES: Course onMathematics at Intermediate Level andPrinciples of Computer Programming.

COURSE DESCRIPTION: Exercises on MATLAB Basics; Control Structures; Arrays; Functions and Files; Programming Techniques; Plotting; Polynomials; Linear Algebraic Equations; Simulink; Solving civil engineering problems using MATLAB; Demonstration on toolboxes for specific civil engineering applications.

COURSE OUTCOMES:After completion of this course, a successful student will be ableto:

- CO4 AnalyzeMATLAB tools to solve complex engineering problemsby following current developments.
- CO5 Design solutions for complex engineering problems using MATLABtoolsfollowing latest developments.
- CO6 Design solutions for complex civil engineering problems using MATLAB programming and simulation, following latest developments.
- CO7 Develop solutions for complex civil engineering applications using MATLAB tool boxes, following latest developments.
- CO8 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on civil engineering materials and construction technology.

DETAILED SYLLABUS:

LIST OF EXERCISES:

A) BASICS OF MATLAB

- 1. MATLAB Windows
- 2. Help
- 3. Input and Output
- 4. File types
- 5. Variables and Keywords
- 6. Arithmetic Operations on Scalars
- 7. Order by Precedence
- 8. Working with MATLAB User Interface
- **B) CONTROL STRUCTURES**
 - 8. If, If ——Else If
 - 9. While

10.For

11.Switch C) MATRICES

- 12. Generation of Row/Column Vector
- 13. Generation of 2 Dimensional/Multidimensional Matrix
- 14. Arithmetic Operation on Arrays
- 15. Determination of Eigen Vector and Eigen Values of a Matrix
- 16. Determination of Rank of the Matrix
- 17. Automating Commands through Scripts

D) GRAPHICS

- 17.2D Plot
- 18.3D Plot
- 19. Mesh Plot and Surface Plots
- 20. Plotting of Wave Forms: Triangle, Square, Sine, etc.

E) POLYNOMIALS

- 21. Determination of Roots of a Polynomial Equation
- 22. Arithmetic Operations on Polynomials
- 23. Least Square Curve Fitting
- 24. Interpolation

F) ALGEBRA, DIFFERENTIATION AND INTEGRATION

- 25. Determine the Solution of Linear and Non-Linear Equation
- 26. Determine the Solution for the First-Order and Higher-Order Differential Equations
- 27. Determine the Solution for Single Variable and Two Variable Integration
- 28. Determine the Summation of Infinite and Finite Series

G) SIMULINK

- 29. Basics of Simulink
- 30. Simulink Model to Solve an Equation
- 31. Simulink Model to Solve Support Reaction of a Beam

H) SOLVING CIVIL ENGINEERING PROBLEMS USING MATLAB

- 32. Centroid of Triangle
- 33. Beam Element Analysis to Determine Slope and Deflection
- 34. Column Element Analysis to Determine Buckling Load
- 35. Mohr's Circle to Predict Shear Stress in Soil Elements
- 36. Hardy Cross Method to Calculate Flow in Pipe Networks
- 37. Design of Flexible Pavement using CBR Method

I) DEMONSTRATION ON TOOLBOXES FOR SPECIFIC CIVIL ENGINEERING APPLICATIONS

- 35. Structural Analysis using Matrices
- 36. Ground Parameter Prediction using Statistical Toolbox
- 37. Creating Hydrological Data using Optimization Toolbox
- 38. Pavement Modelling using Fuzzy Logic Toolbox
- 39. Ground Water Modelling by Neural Networks

TEXT BOOKS

- 1. Raj Kumar Bansal, Ashok Goel, Manoj Kumar Sharma, "*MATLABand its Applications in Engineering*", Pearson Education, 2012.
- 2. Rudra Pratap, "*Getting Started with MATLAB: A QuickIntroduction for Scientists and Engineers*", Oxford UniversityPress, New York, 2010.

REFERENCES

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- 1. Amos Gilat, "MATLAB-An Introduction with Applications", Wiley India.
- 2. Stephen J.Chapman, "Programming in MATLAB for Engineers", Cengage Learning, 2011.
- 3. Math Works Tool Boxes, http://in.mathworks.com/support/ documentation.

ADDITIONAL LEARNING RESOURCES

- 1. Edward B. Magrab, Shapour Azarm, Balakumar Balachandran, James Duncan, Keith Herold, Gregory Walsh, "An Engineer's Guide to MATLAB, 3e: with Applications from Mechanical, Aerospace, Electrical, and Civil Engineering", Prentice Hall, 2011.
- **2.** Sergey E. Lyshevski, "*Engineering and Scientific Computations Using MATLAB*", Wiley Interscience.