

Rayat Shikshan Sanstha's  
Yashavantrao Chavan Institute of Science, Satara (Autonomous)  
Introduce Syllabus 2020

## Department of Electronics

### Introduce Syllabus of Career Oriented Courses

#### MATLAB and Octave Programming

##### Program Objectives of the Course:

Familiarization of the syntax, semantics, data-types and library functions of numerical computing languages such as MATLAB and Octave or SCILAB and application of such languages for implementation/simulation and visualization of basic mathematical functions relevant to electronics applications

##### Program Outcomes:

At the end of this course, the students should be able to

1. Understand the need for simulation/implementation for the verification of mathematical functions.
2. Understand the main features of the MATLAB and Octave or SCILAB program development environment to enable their usage in the higher learning.
3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB and Octave or SCILAB
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display
5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB and Octave or SCILAB

### Course Structure

Level	Class	Semester	Paper No.	Paper Code	Contact Hours	Credits	Marks
I	B.Sc-I	I	PT I	CET 101	36	3	100
		II	PT II	CET 202	36	3	100
			PL I	CEL 101	96	4	100
		<b>Total</b>			<b>168</b>	<b>10</b>	<b>300</b>
II	B.Sc-II	III	PT III	CET 301	36	3	100
		IV	PT IV	CET 402	36	3	100
			PL II	CE L 202	96	4	100
		<b>Total</b>			<b>168</b>	<b>10</b>	<b>300</b>
III	B.Sc-III	V	PT V	CET 501	36	3	100
		VI	PT VI	CET 602	36	3	100
			PL III	CEL 303	96	4	100
		<b>Total</b>			<b>168</b>	<b>10</b>	<b>300</b>

**Total No. of Papers: Theory: 6, Practical: 3,  
Theory: Semester, Practical: Annual, Project: Annual**

**PT: Paper Theory, PL: Paper Lab, E: Name of Subject, T: Theory, L: Lab, P: Project**

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## Department of Electronics

### Certificate Course MATLAB and Octave Programming

#### Semester-I

#### CET 101: Introduction with MATLAB and Octave

(Contact Hrs: 36 Credits: 3)

#### Learning Objectives:

1. To learn fundamental concept of computer structural design
2. To learn basic concept of computer programming languages
3. To study about MATLAB environment
4. To study about Octave environment

#### **Unit I: Fundamental concept of computer structural design** **09**

Introduction, Definition of computer, characteristics, Block diagram - Input Unit, Memory Unit, Output unit, Central processing unit, Limitations and Advantages of Computer,

#### **Unit II: Fundamentals of programming Languages** **09**

Introduction, Languages – Machine Language, Assembly Language, High Level Languages Translators- Assembler, Compiler and Interpreter

#### **Unit III: Introduction to MATLAB Environment** **09**

Introduction, starting and ending a MATLAB session, command window, command history window, work space current directory, edit window, figure window, help feature.

#### **Unit IV: Introduction to Octave Environment** **09**

Introduction, starting and ending an Octave and Octave session, command window, command history window, File browser, work space current directory, variable editor, figure window, help feature.

**Learning Outcomes:**

Student is able to

1. Identify different blocks of computer Hardware
2. Demonstrate basic of computer programming languages
3. Demonstrate the MATLAB environment
4. Demonstrate the Octave environment

**Reference Books:****Reference books:**

1. MATLAB and Its applications in Engineering- Bansal, Goel, Sharma- Pearson.
2. Getting Started with MATLAB –Rudra Pratap- Oxford University Press
3. MATLAB Programming for Engineers- Chapman-Cengage Learning
4. Programming in MATLAB- Herniter- Cengage Learning
5. Introduction to Matlab 7, 1/e, Dolores Etter ,Pearson Education
6. Mastering MATLAB 7, 1/e Duane C. Hanselman, Pearson
7. Fundamentals of Signals and Systems Using the Web and Matlab, 3/e, Edward W. Kamen, Pearson
8. Introduction to GNU Octave, Jason Lachniet, Third Edition
9. Introduction to Octave , Dr. P.J.G. Long, Department of Engineering University of Cambridge

## Certificate Course MATLAB Programming

### Semester-II

#### CET 202: MATLAB and Octave Programming - I

(Contact Hrs: 36 Credits: 3)

#### Learning Objectives

1. To learn about commands in MATLAB and Octave
2. To learn about files in MATLAB and Octave
3. To study constant in MATLAB and Octave
4. To learn Variables and Expressions in MATLAB and Octave

#### **Unit I: Commands in MATLAB and Octave**

**09**

**MATLAB:** Introduction, help command, look for command, General commands, Directory command, Workspace command, Termination commands. Advantages of MATLAB, disadvantages of MATLAB

**Octave:** Introduction, The help command, The disp command, Date and time command, clock command

#### **Unit II: Files in MATLAB and Octave**

**09**

**MATLAB:** Introduction, M-files, MAT-files, MEX-files, Platform, Search path,

**Octave:** Introduction, Opening and Closing Files, Script files

#### **Unit III: Constants in MATLAB and Octave**

**09**

**MATLAB:** Introduction, Character set, Data types, Numeric constant, character constant, special constant.

**Octave:** Introduction, Mathematical Constants, Data Types,

#### **Unit IV: Variables and Expressions in MATLAB and Octave**

**09**

Introduction, Variables, Arithmetic operators, Relational operators, Logical operators, and functions, Hierarchy of operations, built in functions, Assignment operators, Illustrative programs.

**Octave:** Introduction, Variables, Arithmetic operators, Relational operators, Logical operators, and functions.

**Learning Outcomes:**

Student is able to

1. Explain different commands in MATLAB and Octave.
2. Understand files in MATLAB and Octave.
3. Know different constant in MATLAB and Octave
4. Understand Variables and Expressions in MATLAB and Octave

**Reference Books:**

1. MATLAB and Its applications in Engineering- Bansal, Goel, Sharma- Pearson.
2. Getting Started with MATLAB –Rudra Pratap- Oxford University Press
3. MODELING & SIMULATION USING MATLAB SIMULINK, Shailendra Jain, Wiley India
4. Applied Numerical Methods With MATLAB, Steven Chapra, TMH
5. Concise Introduction to Matlab, William Palm III, tata mcgrawhill.
6. Applied Numerical Methods with MATLAB for Engineers and Scientists Steven Chapra, tata mcgrawhill.
7. Engineering Computation: An Introduction Using MATLAB and Excel Joseph Musto, William Howard, Richard Williams, tatamcgrawhill
8. Introduction to MATLAB for Engineers, William Palm III, tatamcgrawhill
9. Introduction to GNU Octave, Jason Lachniet, Third Edition
10. Introduction to Octave , Dr. P.J.G. Long, Department of Engineering University of Cambridge

## **CEL 101 (Practical): MATLAB and Octave Programming Lab I (Contact Hrs: 96 Credits: 04)**

### **Learning Objectives:**

1. To learn computer organization, input-output and memory devices operations
2. To study MATLAB and Octave environment
3. Study of Windows in MATLAB and Octave
4. To study MATLAB and Octave Programming

### **List of Practical's (20) GROUP A**

1. Demonstration of Input, Output Devices and CPU.
2. Demonstration of and Pointing and Memory Device.
3. Study of Introduction to MATLAB
4. Component's in MATLAB environment.
5. Tool boxes in MATLAB
6. Study of Windows in MATLAB
7. Study of Introduction to Octave
8. Component's in Octave environment.
9. Tool boxes in Octave
10. Study of Windows in Octave

**GROUP B**

1. To Study Commands in MATLAB
2. To Study files in MATLAB
3. To study Constants in MATLAB
4. To study variables in MATLAB
5. To study operators in MATLAB
6. To Study Commands in Octave
7. To Study files in Octave
8. To study Constants in Octave
9. To study variables in Octave
10. To study operators in Octave

**Project Work**

Project Work Every student should take up a project & submit in the report the work he/she has carried out. The project work will be assessed independently at the time of practical examination

**Learning Outcomes:**

Students will be able to

1. Describe computer organization, input-output and memory devices operations
2. Explain MATLAB and Octave environment
3. Understand windows in MATLAB and Octave
4. Develop MATLAB and Octave Programming

**Reference Books:**

1. . MATLAB and Its applications in Engineering- Bansal, Goel, Sharma- Pearson.
2. Getting Started with MATLAB –Rudra Pratap- Oxford University Press
3. MODELING & SIMULATION USING MATLAB SIMULINK, Shailendra Jain, Wiley India
4. Applied Numerical Methods With MATLAB, Steven Chapra, TMH
5. Concise Introduction to Matlab, William Palm III, tata mcgrawhill.
6. Applied Numerical Methods with MATLAB for Engineers and Scientists Steven Chapra, tata mcgrawhill.
7. Engineering Computation: An Introduction Using MATLAB and Excel

- Joseph Musto, William Howard, Richard Williams, tatamcgrawhill
8. Introduction to GNU Octave, Jason Lachniet, Third Edition
  9. Introduction to Octave , Dr. P.J.G. Long, Department of Engineering University of Cambridge
  10. GNU Octave, John W. Eaton David Bateman Søren Hauberg Rik Wehbring Edition 6 , October 2020.

**BOS Subcommittee**

Mr. G.R. Attar	Chairman
Mr. S. K. Shinde	Member
Dr. D. S. Aldar	Member (Associate Professor, KBPCOE, Satara)

**Mr. J. A. Wagh**

**Chairman**

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## Department of Electronics

### Certificate Course MATLAB Programming

#### Semester-III

### CET 301: Matrices and Polynomials in MATLAB and Octave

(Contact Hrs: 36 Credits: 3)

#### Learning Objectives:

1. To learn about vectors
2. To study Matrix in MATLAB and Octave
3. To Learn Arrays in MATLAB
4. To learn Polynomials in MATLAB and Octave

#### Unit I: Vectors in MATLAB and Octave

09

**MATLAB:** Introduction, Scalar and vectors, Assigning data to vector/scalar, Vector product, vector transpose, creation of evenly spaced row vectors, some useful commands.

**Octave:** Introduction, Building vectors, the colon notation, Displaying large vectors and matrices, Vector creation functions, Extracting elements from a vector, Vector math's.

#### Unit II: Matrix in MATLAB and Octave

09

**MATLAB:** Introduction, Entering data in matrices, matrix subscripts, sub matrices/sub arrays, multi dimension matrices, matrix manipulations, generation of special matrices, useful commands in matrix.

**Octave:** Matrix multiplication, the transpose operator, Matrix creation function, Building composite matrices, Matrices as tables, Extracting bits of matrices.

#### Unit III: Arrays in MATLAB and Octave

09

**MATLAB:** Introduction of array, Arithmetic operations on arrays, Function with array inputs, Logical operators, Relational operators, cell arrays, useful commands of structure and cells.

**Octave:** Introduction of array, Cell Arrays, Operators.

#### Unit IV: Polynomials in MATLAB and Octave

09

**MATLAB:** Introduction, Polynomials, entering a polynomial, polynomial evaluation, roots of polynomial, polynomial arithmetic, characteristics of polynomial of a metrics, polynomial integration, polynomial differentiation, polynomial curve fitting. Evaluation of polynomials.

**Octave:** Introduction, Polynomials, entering a polynomial, polynomial evaluation, roots of polynomial, polynomial integration, polynomial differentiation, polynomial curve fitting. Evaluation of polynomials.

### Learning Outcomes:

Student is able to

1. Understand about vectors
2. Explain Matrix in MATLAB and Octave
3. Describe Arrays in MATLAB and Octave
4. Describe Polynomials in MATLAB and Octave

### Reference Books:

1. MATLAB and Its applications in Engineering- Bansal, Goel, Sharma- Pearson.
2. Getting Started with MATLAB –Rudra Pratap- Oxford University Press
3. MODELING & SIMULATION USING MATLAB SIMULINK, Shailendra Jain, Wiley India
4. Applied Numerical Methods With MATLAB, Steven Chapra, TMH
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6. Applied Numerical Methods with MATLAB for Engineers and Scientists Steven Chapra, tata mcgrawhill.
7. Engineering Computation: An Introduction Using MATLAB and Excel Joseph Musto, William Howard, Richard Williams, tatamcgrawhill
8. Introduction to MATLAB for Engineers, William Palm III, tatamcgrawhill
9. Introduction to Matlab 7 for Engineers, William Palm III, tatamcgrawhill
10. MATLAB Demystified, David McMahon, tatamcgrawhill
11. Introduction to GNU Octave, Jason Lachniet, Third Edition
12. Introduction to Octave , Dr. P.J.G. Long, Department of Engineering University of Cambridge
13. GNU Octave, John W. Eaton David Bateman Søren Hauberg Rik Wehbring Edition 6 , October 2020.

## Certificate Course MATLAB Programming

### Semester-IV

#### CET 402: Graphics and Simulink for MATLAB and Octave

(Contact Hrs: 36 Credits: 3)

#### Learning Objectives :

1. To learn data input/output statements in MATLAB and Octave
2. To study Graphics in MATLAB and Octave
3. To learn Control Structure in MATLAB and Octave
4. To Create a model of dynamic system in the Simulink window

#### **Unit I: Input –Output statement**

**10**

Introduction, Data input-assignment statement and variable declaration, Interactive inputs-input function, keyboard command, menu function pause command, Reading /storing file data- load function, save function, dlmread function, dlm write function, textscan and textread function, Output commands-default format, format command, disp function, Low level Input-Output functions

#### **Unit II: Graphics in MATLAB and Octave**

**09**

**MATLAB Graphics:** Introduction, two dimensional plots, multiple plots, Style Options, legend command, sub plots, specialized two dimensional plots, three dimensional plots.

**Octave Graphics:** Introduction, putting several graphs in one window, 3D plots, changing the viewpoint, Plotting surfaces, Images and Movies

#### **Unit III: Control Structure in MATLAB and Octave**

**08**

**MATLAB:** Introduction, Loops- for loop, nested for loop, while loop, branches control structure- if control structure, switch statement, break statement, continue statement, Error statement, try catch structure.

**Octave:** Control statements, if...else selection, switch selection, for loops, while loops Accuracy and precision.

#### **Unit IV: Simulink Basics in MATLAB**

**09**

Introduction, opening Simulink model, Collecting blocks to create a model, modifying block parameters, Labelling blocks, Connecting blocks, Labelling signal lines, saving the model, Solvers.

**Learning Outcomes:**

Students are able to

1. Understand input/output statements in MATLAB and Octave
2. Plot Graphs in MATLAB and Octave
3. Understand Control Structure in MATLAB and Octave
4. Create a model of dynamic system in the Simulink window.

**Reference Books:**

1. MATLAB and Its applications in Engineering- Bansal, Goel, Sharma- Pearson.
2. Getting Started with MATLAB –Rudra Pratap- Oxford University Press
3. MODELING & SIMULATION USING MATLAB SIMULINK, Shailendra Jain, Wiley India
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8. Introduction to MATLAB for Engineers, William Palm III, tatamcgrawhill
9. Introduction to Matlab 7 for Engineers, William Palm III, tatamcgrawhill
10. MATLAB Demystified, David McMahan, tatamcgrawhill
11. Introduction to GNU Octave, Jason Lachniet, Third Edition
12. Introduction to Octave , Dr. P.J.G. Long, Department of Engineering University of Cambridge
13. GNU Octave, John W. Eaton David Bateman Søren Hauberg Rik Wehbring Edition 6, October 2020.

**CEL 202 (Practical): MATLAB and Octave Programming Lab II**  
**(Contact Hrs: 96 Credits: 04)****Learning Objectives:**

1. To learn matrix operations with MATLAB and Octave.
2. To facilitate with plot commands in MATLAB and Octave
3. To provide concept full knowledge of control statements in MATLAB and Octave.
4. To provide strong foundation of MATLAB Simulink

**List of Practical's (20)**  
**GROUP A**

1. To Study of basic matrix operations in MATLAB
2. To solve linear equation in MATLAB.
3. To study functions in MATLAB
4. Write a program to generate first five odd numbers in MATLAB.
5. Determination of roots of a polynomial in MATLAB.
6. Determination of polynomial using method of Least Square Curve Fitting.
7. To Study the basic matrix operations in Octave
8. To study functions in Octave.
9. Determination of roots of a polynomial Octave.
10. Accessing Elements in a Vector in Octave.

**GROUP B**

1. Use fscanf function in array format in MATLAB.
2. Use of fwrite function for writing binary data of different format in MATLAB.
3. Use of plot command in MATLAB.
4. Use of plot3 command in MATLAB.
5. Write a program using for loop statement in MATLAB.
6. Design half wave rectifier circuit using Simulink.
7. Write a program using switch structure in Octave.
8. Use of plot command in Octave.
9. Use of plot3 command in Octave.
10. Write a program using for loop statement in Octave.

**Project Work**

Project Work Every student should take up a project & submit in the report the work he/she has carried out. The project work will be assessed independently at the time of practical examination

**Learning Outcomes:**

Students will be able to

1. Understand matrix operations with MATLAB and Octave.
2. Describe the plot commands in MATLAB and Octave
3. Develop programming skill of control statements in MATLAB and Octave.
4. Simulate MATLAB program

**Reference Books:**

1. . MATLAB and Its applications in Engineering- Bansal, Goel, Sharma- Pearson.
2. Getting Started with MATLAB –Rudra Pratap- Oxford University Press
3. MODELING & SIMULATION USING MATLAB SIMULINK, Shailendra Jain, Wiley India
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**Department of Electronics**

**Certificate Course MATLAB Programming**

**Semester-V**

**CET 501: Functions and Differential Equations in MATLAB and Octave**

**Semester-VI**

**CET 602: MATLAB and Octave Applications**

**CEL 303 (Practical): MATLAB and Octave Programming Lab III**

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Mr. S. K. Shinde	Chairman
Mr. G.R.Attar	Member
Dr. D. S. Aldar,	Member (Associate Professor, KBPCOE, Satara)

**Mr. J. A. Wagh**  
**Chairman**  
**B.O.S. (Electronics)**