

Department of Technical Education
Diploma in Electronics & Communication
Sixth Semester
MATRIX LAB

Subject Code:

Max. Marks 100
Contact Hrs: 96hrs

PART A:

1. Introduction to MATRIX LAB

- 1.1. MATLAB Environment: Command window, command history window, work space, current directory, edit window, figure window, array window..
- 1.2 Help feature- help browser, help command, search command
- 1.3 Types of files: .m files, .mat files, .mex files.
- 1.4 Some basic commands: General commands, directory commands, workspace commands, termination commands, help commands

2. Constants, variables & expressions.

- 2.1 Character set data types, constants & variables, operators
- 2.2 Hierarchy of operations
- 2.3 Built-in functions & assignment statements

3. Input –Output Statements

3.1 Data input

- 3.1.1 Assignment statement & variable declaration
- 3.1.2 Interactive inputs
- 3.1.3 Reading/ storing file data

3.2 Output commands

3.3 Low-level input-output functions.

4. Creating Arrays

- 4.1 Creating a one-dimensional array (vector)
- 4.2 Creating a two-dimensional array (matrix)
- 4.3 Array (1D and 2D) addressing and indexing.
- 4.4 Using a colon in addressing arrays
- 4.5 Spectral analysis of signals: stationary and non-stationary signals using DFT
- 4.6 Spectral analysis of gray scale images using DFT
- 4.7 Concept of 2D image

5. Graphics

- 5.1 2D and 3D plots
- 5.2 Multiple plots using holding command

6. Control Structures

- 6.1 Loops- for, nested for, while.
- 6.2 Branch control structures: if, if-else, switch, break, continue, error, try-catch

Soft wares

Matrix Lab can be performed using MATLAB/SCILAB (free software).

PART B

1. Evaluate the quadratic equation $ax^2 + bx + c$, assuming values for x .
- 2 Calculate the following quantities (θ in degrees) $\sin\theta/6$, $\cos \theta$, $\tan \theta/2$ and $\sin^2 \theta/6 + \cos^2 \theta /6$
3. Write a program to plot the curve for a function described by the equation $y = x^3 + 2x^2 - 5$, where x varies from -10 to +10.
- 4 Write a program to plot the curve for equation $y = \sin x + \cos x$ as x varies from 0 to 2π ; make use of labels along x & y axis.
5. Generate two sinusoids and compute their product. Plot them in time and frequency domain (Fourier spectrum).
6. Compute the Addition, Subtraction, Division and Multiplication of two matrices.
- 7 Compute the inverse of a matrix.
8. Use matrix method to solve for currents based on KCL in an electrical circuit having minimum of three loops.

9. Current flowing through the semiconductor diode is given by

$$i_d = i_0 [\exp(qvd/kT) - 1], \text{ where } k = \text{ Boltzmann's constant } (1.38 \times 10^{-23} \text{ joules/K})$$

$$q = 1.6 \times 10^{-19} \text{ coulombs, } T = \text{ Absolute Temperature}$$

- a) Write a program to calculate the current flowing through the diode for all voltages from -0.2v to +0.25 volts in a step of .01v
 - b) Plot the current as a function of applied voltage.
10. A series resonant circuit driven by a sinusoidal AC voltage source of 230v, 50 Hz. The current through the resonant circuit is given by $i = v / R + j(X_L - X_C)$ (Assume R, L C values).
- a) Write a program to calculate and plot magnitude of current verses frequency range between 100 kHz to 10MHz
 - b) The phase angle as a function of frequency for the range of 100 kHz to 10MHz.
 - c) The magnitude and phase angle of current as a function of frequency on two subplots of single figure.
11. Create a function handle for a nested function to plot the parabola.
12. Write a program to verify the logic equation $F = \overline{A} \overline{B} \overline{C} + \overline{A} B \overline{C} + \overline{A} \overline{B} C + \overline{A} B C$. Also, generate truth table for this function.
13. Generate the following signals (assume f) and plot their frequency spectrum using DFT commands. a) Square function b) Ramp function c) Sine function.
14. Verify Sampling theorem.
15. Find the impulse response of a simple LTI system.
16. For a given binary data, generate NZ and NRZ patterns.
17. Generate a) ASK, b) FSK and c) QPSK waveforms.
18. Perform the following image process tasks
- a) Read and write images in JPEG/BMP/TIFF formats
 - b) Convert RGB to Grey scale image.
 - c) Display images using appropriate commands
 - d) Contrast enhancement of gray scale image
 - e) Histogram of gray scale image
 - f) Resize a given image
19. For age-height relation of a group of people, compute mean, standard deviation and variance.
20. Plot the frequency response of LPF, HPF, BS and BP filters.

Text Books:

1. MATLAB and its Applications in Engineering – Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson Publications
2. MATLAB: An introduction with applications- Amos Gilat, Wiley India Publications
3. Getting started with MATLAB: Rudra Pratap, Oxford University Press.

Scheme of Evaluation

1 Record	05
2 Theory	10
3 Writing any two programs	30
4 Entering one Program	15
5 Execution & Result	20
6 viva-voce	20
Total	100
