# Cover page - Include the following:

• Name and ID number

• Course number and lab Section Date performed

• Due Date

• Lab Instructor Name

# Objectives –

This lab aims to introduce additional MATLAB features and explore the properties of signals and systems. Specifically, it involves:

1. Familiarization with MATLAB's array processing, looping, and conditional selection features.
2. Verification of various signal properties such as linearity, evenness, and oddness using MATLAB scripts.
3. Determination of system response using the MATLAB convolution function.
4. Identification of linear and time-invariant properties in discrete systems.

# Theory -

In this experiment, MATLAB's array processing features will be used to investigate fundamental properties of signals and systems. Key theoretical aspects include:

* **Signal Linearity:** A linear system obeys the principle of superposition, where the response to the sum of inputs is equal to the sum of individual responses and the response to the inputs scaled by a constant is equal to the input scaled by that constant.
  + , Then .
* **Even Signals:** A signal is classified as even if .
* **Odd Signals:** A signal is classified as odd if .
* **Convolution:** The convolution of two signals describes the output of a linear system for a given input and is expressed as .

# Tasks/Results/Discussion

Present the tasks completed in the experiments along with the results of the actions took to

complete the task. Complement the task presentation with discussion and observations.

# Questions –

answer the questions posed in the handouts or by the lab instructor.

# Conclusions –

State what was achieved in the lab and contrast with the experiment objectives. Conclude on the

salient portions of the lab. Do not write conclusions of the form:

*“This was an excellent experiment for me to learn how to use MATLAB and allowed me to have*

*a better understanding of the analog and digital filter techniques in MATLAB... I found this lab*

*extremely long; however, it was a rewarding experience in the end. To conclude, I really*

*enjoyed this lab and it was an excellent learning opportunity.”*

A proper conclusion would be of the following manner:

*“This lab explores the use of the MATLAB FDA tool to design both analog and digital filters.*

*Simulink was used to import an audio file and the differences between up and down sampling*

*were observed. The sample was also filtered, and the effects of the filtering were noted.”*

# Appendix –

Include in the appendix your MATLAB code. The MATLAB programs are to be demonstrated

to the lab TA and a printout of your MATLAB code and/or results is to be **signed** by the lab TA.

Your lab TA will provide more specific details with regards to the demonstration and signing of

the printouts during each lab session. Your lab instructor will also provide details concerning the3 | P a g e

submission of the written lab report.