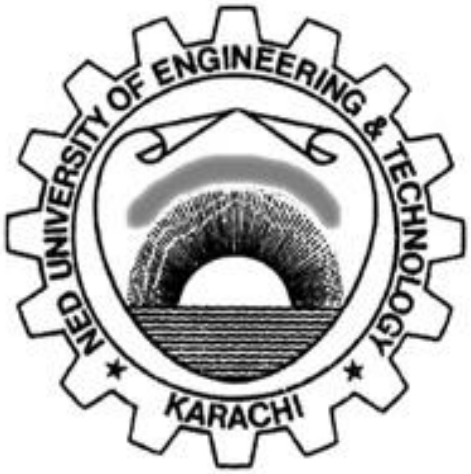
Practical Workbook

CS-419

Digital Signal Processing



Name : _____

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Roll No : _____

Department: _____

Department of Computer & Information Systems Engineering
NED University of Engineering & Technology

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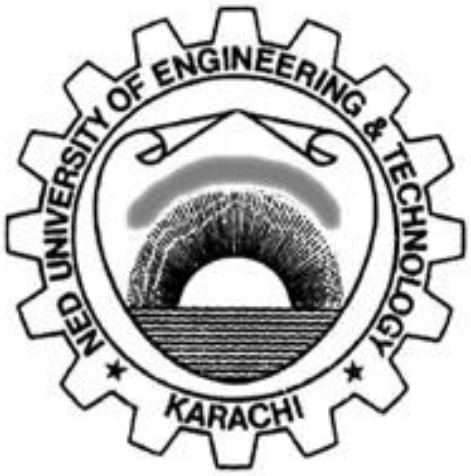

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Revised in:

October 2019

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INTRODUCTION

This workbook has been compiled to assist the conduct of practical classes for CS-419 Digital Signal Processing. The area of digital signal processing has advanced rapidly over the last four decades. This advancement is attributed to the progress in digital computer technology and integrated circuit fabrications. There are many reasons why the digital processing of an analog signal is preferred over the signal processing directly in analog domain. The advantages of DSP are common to many digital systems and include: Versatility, Repeatability, and Accuracy. DSP is used in a very wide variety of applications.

The Course Profile of CS-419 Digital Signal Processing lays down the following Course Learning Outcomes:

"Explore contemporary digital signal processing techniques (C3, PLO-2)"

"Investigate digital filters (C4, PLO-3)"

"Demonstrate the use of modern tools and techniques for digital signal processing (P4, PLO-5)"

All lab sessions of this workbook have been designed to assist the achievement of the above CLOs. A rubric to evaluate student performance has been provided at the end of the workbook.

The DSP Labs introduce students to DSP design and analysis techniques that are core knowledge for DSP engineers, and which serve as solid grounding for advanced level work in DSP. Lab 1-6, 9-11 emphasize on the key DSP concepts, such as overview of discrete time signal and systems in time domain, and frequency domain, sampling and reconstruction of analog signals, signal and systems representation in complex frequency domain, solution of differential equations using z transform, computation of Fourier transform and its efficient implementation, Discrete Fourier transform and Fast Fourier transform, Structure for the implementation of digital filters, FIR Filter design and IIR Filter Design. All of these Labs will be performed using MATLAB that provides an understanding of how to design signal processing systems and process data in a practical way, using software and analyze output by simulations.

Lab 7, 8, 12-14 gives students an introduction to real-time DSP requirements by introducing them with some educational DSP kits and FPGA board with real-time capability, which will help them get acquainted with the programming of these devices and some typical hardware and functions found in practical applications. It heightens students' awareness of the diverse practical DSP applications by exposing them to some practical DSP demos, hardware and operations involved in this area and also to provide students with a learning platform on which to further experiment with DSP.

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