INTRODUCTION TO LINEAR SYSTEM

SECOND EDITION

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PREFACE

This textbook provides a solid foundation in signal and system theory, differential equation solution in system analysis and different types of signals transformation that relate to linear systems which enable students to develop an instinctive grasp of the fundamentals. The book begins with the basics of analog signals and introduces the concept of linear time invariant (LTI) signals. It then covers the sampling processes in details and discusses signals and operation on different properties of signals. It includes the combination of different properties of signals with adequate examples and exercises. With an emphasis on the solution for linear differential equation used for signals and systems, multiplication factor and classical methods are explained with several examples and exercises. Besides each concept is presented with examples and exercises, details explanation in sequence steps on solving the problems is presented to help students obtain understanding and acquaint the nature of each topic. The book would interest students of electrical engineering for diploma and degree students at any higher instituition.

CHAPTER 1
INTRODUCTION TO SIGNALS AND SYSTEMS

LEARNING OBJECTIVES:

- To define signal and system
- To classify the signals and systems
- To represent signals in mathematical form
- To manipulate and transform signals

1.0 INTRODUCTION TO SIGNAL

A signal is defined as a function of time that represents a physical variable, carries information and associated with a system. As example, a voltage signal as depicted in Figure 1.1 shows an information of voltage signal, $v(t)$ in volts changing with respect to time, t in seconds. There are many equipments used to measure varities of signals. As example, an oscilloscope is an instrument that used to screen signals of voltage, current and many other parameters as depicted in Figure 1.2.

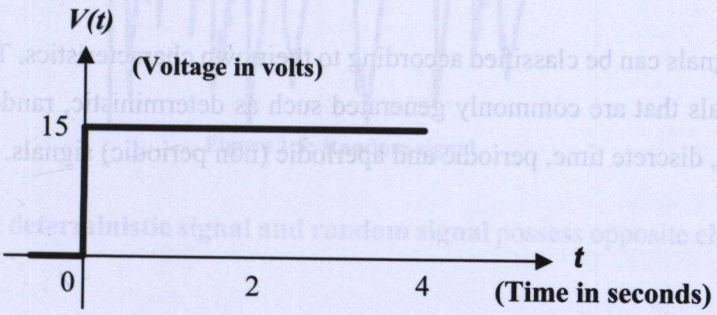

Figure 1.1: A voltage signal

The second edition of Introduction to Linear System provides comprehensive coverage of basic and fundamental of linear signals and systems included mathematical concepts apply to solve engineering problems. The emphases are covered on continuous-time signals and systems, Fourier series, differential equations and Laplace transform. The differential equations and Laplace Transform will be used in solving simple circuit problems.

This edition is well supported by numerous practice problems and included clear illustrations throughout the book to achieve the course outcome so that student will be able to classify signals and systems as well as perform signal manipulations, able to express periodic signal into Fourier Series representation and lastly able to obtain system responses using differential equations and Laplace Transform with application to electrical circuit.

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PENERBIT PRESS
UNIVERSITI TEKNOLOGI MARA

ISBN 978-629-496-092-3
Harga / Price
RM 50.00
9 786294 960923