## **Analogue and Digital Communication Lab** (EL-3003)

### LABORATORY MANUAL

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Analogue Conventional Amlitude Modulation and **Demodulation using Matlab** 

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NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES, ISLAMABAD

# **Digital Communication Lab Manual Using Matlab Qpsk**

**Dennis Silage** 

#### **Digital Communication Lab Manual Using Matlab Qpsk:**

**Digital Communications With Lab Manual, 3/E** Bhat K. N. Hari,2010-09 LAB PRIMER THROUGH MATLAB® NAVAS, K. A., JAYADEVAN, R., 2014-02-19 This systematically designed laboratory manual elucidates a number of techniques which help the students carry out various experiments in the field of digital signal processing digital image processing digital signal processor and digital communication through MATLAB in a single volume A step wise discussion of the programming procedure using MATLAB has been carried out in this book The numerous programming examples for each digital signal processing lab image processing lab signal processor lab and digital communication lab have also been included The book begins with an introductory chapter on MATLAB which will be very useful for a beginner The concepts are explained with the aid of screenshots Then it moves on to discuss the fundamental aspects in digital signal processing through MATLAB with a special emphasis given to the design of digital filters FIR and IIR Finally digital communication and image processing sections in the book help readers to understand the commonly used MATLAB functions At the end of this book some basic experiments using DSP trainer kit have also been included Audience This book is intended for the undergraduate students of electronics and communication engineering electronics and instrumentation engineering and instrumentation and control engineering for their laboratory courses in digital signal processing image processing and digital communication Key Features Includes about 115 different experiments Contains several figures to reinforce the understanding of the techniques discussed Gives systematic way of doing experiments such as Aim Theory Programs Sample inputs and outputs Viva voce Digital Signal Processing Laboratory Experiments Using MATLAB Hardik questions and Examination questions Modi, 2014-03-24 Technical Report from the year 2014 in the subject Computer Science Technical Computer Science language English abstract This is Laboratory Manual of Digital Signal Processing All experiments are performed on MATLAB e q List of Experiments 1 To represent basic signals like Unit Impulse Ramp Unit Step Exponential 2 To generate discrete sine and cosine signals with given sampling frequency 3 To represent complex exponential as a function of real and imaginary part 4 To determine impulse and step response of two vectors using MATLAB 5 To perform convolution between two vectors using MATLAB 6 To perform cross correlation between two vectors using MATLAB Problem-Based Learning in Communication Systems Using MATLAB and Simulink Kwonhue Choi, Huaping Liu, 2016-02-10 Designed to help teach and understand communication systems using a classroom tested active learning approach Discusses communication concepts and algorithms which are explained using simulation projects accompanied by MATLAB and Simulink Provides step by step code exercises and instructions to implement execution sequences Includes a companion website that has MATLAB and Simulink model samples and templates password matlab **Digital Signal Processing for Wireless Communication** using Matlab E.S. Gopi, 2021-10-21 The updated book presents Matlab illustrations on various digital signal processing DSP techniques such as random process time varying wireless system model and detection and estimation theory used in wireless

communication The book also covers recent wireless techniques like OFDM massive MIMO techniques non orthogonal multiple access millimeter wave MIMO full duplex cognitive radio co operating communication unmanned aerial vehicles etc This book is suitable for those who are doing basic and applied research in digital signal processing for wireless MATLAB/Simulink for Digital Communication Won Y. Yang, 2018-03-02 Chapter 1 Fourier Analysis 1 1 1 CONTINUOUS TIME FOURIER SERIES CTFS 2 1 2 PROPERTIES OF CTFS 6 1 2 1 Time Shifting Property 6 1 2 2 Frequency Shifting Property 6 1 2 3 Modulation Property 6 1 3 CONTINUOUS TIME FOURIER TRANSFORM CTFT 7 1 4 PROPERTIES OF CTFT 13 1 4 1 Linearity 13 1 4 2 Conjugate Symmetry 13 1 4 3 Real Translation Time Shifting and Complex Translation Frequency Shifting 14 1 4 4 Real Convolution and Correlation 14 1 4 5 Complex Convolution Modulation Windowing 14 1 4 6 Duality 17 1 4 7 Parseval Relation Power Theorem 18 1 5 DISCRETE TIME FOURIER TRANSFORM DTFT 18 1 6 DISCRETE TIME FOURIER SERIES DFS DFT 19 1 7 SAMPLING THEOREM 21 1 7 1 Relationship between CTFS and DFS 21 1 7 2 Relationship between CTFT and DTFT 27 1 7 3 Sampling Theorem 27 1 8 POWER ENERGY AND CORRELATION 29 1 9 LOWPASS EQUIVALENT OF BANDPASS SIGNALS 30 Chapter 2 PROBABILITY AND RANDOM PROCESSES 39 2 1 PROBABILITY 39 2 1 1 Definition of Probability 39 2 1 2 Joint Probability and Conditional Probability 40 2 1 3 Probability Distribution Density Function 41 2 1 4 Joint Probability Density Function 41 2 1 5 Condtional Probability Density Function 41 2 1 6 Independence 41 2 1 7 Function of a Random Variable 42 2 1 8 Expectation Covariance and Correlation 43 2 1 9 Conditional Expectation 47 2 1 10 Central Limit Theorem Normal Convergence Theorem 47 2 1 11 Random Processes 49 2 1 12 Stationary Processes and Ergodic Processes 51 2 1 13 Power Spectral Density PSD 53 2 1 14 White Noise and Colored Noise 53 2 2 LINEAR FILTERING OF A RANDOM PROCESS 57 2 3 PSD OF A RANDOM PROCESS 58 2 4 FADING EFFECT OF A MULTIPATH CHANNEL 58 Chapter 3 ANALOG MODULATION 71 3 1 AMPLITUDE MODULATION AM 71 3 1 1 DSB Double Sideband AM Amplitude Modulation 71 3 1 2 Conventional AM Amplitude Modulation 75 3 1 3 SSB Single Sideband AM Amplitude Modulation 78 3 2 ANGLE MODULATION AGM FREQUENCY PHASE MODULATIONS 82 Chapter 4 ANALOG TO DIGITAL CONVERSION 87 4 1 QUANTIZATION 87 4 1 1 Uniform Quantization 88 4 1 2 Non uniform Quantization 89 4 1 3 Non uniform Quantization Considering the Absolute Errors 91 4 2 Pulse Code Modulation PCM 95 4 3 Differential Pulse Code Modulation DPCM 97 4 4 Delta Modulation DM 100 Chapter 5 BASEBAND TRANSMISSION 107 5 1 RECEIVER RCVR and SNR 107 5 1 1 Receiver of RC Filter Type 109 5 1 2 Receiver of Matched Filter Type 110 5 1 3 Signal Correlator 112 5 2 PROBABILITY OF ERROR WITH SIGNALING 114 5 2 1 Antipodal Bipolar Signaling 114 5 2 2 On Off Keying OOK Unipolar Signaling 118 5 2 3 Orthogonal Signaling 119 5 2 4 Signal Constellation Diagram 121 5 2 5 Simulation of Binary Communication 123 5 2 6 Multi Level amplitude PAM Signaling 127 5 2 7 Multi Dimensional Signaling 129 5 2 8 Bi Orthogonal Signaling 133 Chapter 6 BANDLIMITED CHANNEL AND EQUALIZER 139 6 1 BANDLIMITED CHANNEL 139 6 1 1 Nyquist Bandwidth 139 6 1 2 Raised Cosine Frequency Response 141 6 1 3

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large body of theory The text puts the focus on topics such as radio and wireless modulation reception and transmission wired networks and fiber optic communications The book also explores packet networks and TCP IP as well as digital source and channel coding and the fundamentals of data encryption Since MATLAB is widely used by telecommunications engineers it was chosen as the vehicle to demonstrate many of the basic ideas with code examples presented in every chapter The text addresses digital communications with coverage of packet switched networks Many fundamental concepts such as routing via shortest path are introduced with simple and concrete examples. The treatment of advanced telecommunications topics extends to OFDM for wireless modulation and public key exchange algorithms for data encryption Throughout the book the author puts the emphasis on understanding rather than memorization The text also Includes many useful take home skills that can be honed while studying each aspect of telecommunications Offers a coding and experimentation approach with many real world examples provided Gives information on the underlying theory in order to better understand conceptual developments Suggests a valuable learn by doing approach to the topic Written for students of telecommunications engineering Communication Systems Principles Using MATLAB is the hands on resource for mastering the basic concepts of telecommunications in a learn by doing format Contemporary Communication Systems Using MATLAB John G. Proakis, Masoud Salehi, 1998 This text contains a large number of MATLAB based problems dealing with topics covered in a first course in communication systems Each chapter contains fundamental concepts briefly reviewed and presents illustration problems using MATLAB Each chapter contains a list of MATLAB files used MATLAB/Simulink for Digital Communication ,2009 Digital Communications With Lab Manual Kn Hari Bhat, 2009-01-01 Advance Communication Lab Manual Dr. Preeta Sharan, 2009 Implementation of a Digital Communication System Using QPSK Modulation Dilip B. Ghate, 1995 With the advances in high speed programmable digital signal processing DSP chips modern communications links are using a combination of DSP techniques and digital communications methods to realize faster reconfigurable and modular systems This thesis details the software implementation of a modern digital communication system combining various DSP functions channel Forward Error Correcting FEC algorithms and digital modulation methods The digital modulation schemes considered here include both baseband and Quadrature Phase Shift Keying QPSK techniques The proposed communication system will serve as a practical tool useful for simulating the transmission of any digital data The various modules of the system include source encoders decoders data compression functions channel encoders decoders and modulators demodulators Implementation consists of coding the various link functions in C and integrating them as a complete system The results show the viability of a QPSK modulated digital communications link and point the direction of future research towards software radio Essentials of Digital Signal Processing Using MATLAB Vinay K. Ingle, John G. Proakis, 2011-03 In this supplementary text MATLAB is used as a computing tool to explore traditional DSP topics and solve problems to gain insight This greatly expands the range and complexity of problems that students can effectively study in the

course Since DSP applications are primarily algorithms implemented on a DSP processor or software a fair amount of programming is required Using interactive software such as MATLAB makes it possible to place more emphasis on learning new and difficult concepts than on programming algorithms Interesting practical examples are discussed and useful problems are explored Digital Signal Processing with MATLAB Manual MD Ariful Islam, 2022-08-12 This laboratory manual deals with the basics of Digital Signal Processing DSP Lab experiment I hope this manual will be very useful for those who want to learn DSP by solving various problems Each program has been written in the MATLAB software according to the various questions and the output is shown step by step Digital Communication Systems Using MATLAB and Simulink Dennis Silage, 2009 Digital Communication using MATLAB and Simulink is intended for a broad audience For the student taking a traditional course the text provides simulations of the MATLAB and Simulink systems and the opportunity to go beyond the lecture or laboratory and develop investigations and projects For the professional the text facilitates an expansive review of and experience with the tenets of digital communication systems **Digital Signal Processing Using MATLAB** Vinay Ingle, John Proakis, 2006-08-10 This supplement to any standard DSP text is one of the first books to successfully integrate the use of MATLAB in the study of DSP concepts In this book MATLAB is used as a computing tool to explore traditional DSP topics and solve problems to gain insight This greatly expands the range and complexity of problems that students can effectively study in the course Since DSP applications are primarily algorithms implemented on a DSP processor or software a fair amount of programming is required Using interactive software such as MATLAB makes it possible to place more emphasis on learning new and difficult concepts than on programming algorithms Interesting practical examples are discussed and useful problems are explored This updated second edition includes new homework problems and revises the scripts in the book available functions and m files to MATLAB V7 Important Notice Media content referenced within the **Digital Signal Processing Using** product description or the product text may not be available in the ebook version MATLAB Vinay K. Ingle, John G. Proakis, 2011-01-01 In this supplementary text MATLAB is used as a computing tool to explore traditional DSP topics and solve problems to gain insight This greatly expands the range and complexity of problems that students can effectively study in the course Since DSP applications are primarily algorithms implemented on a DSP processor or software a fair amount of programming is required Using interactive software such as MATLAB makes it possible to place more emphasis on learning new and difficult concepts than on programming algorithms Interesting practical examples are discussed and useful problems are explored Important Notice Media content referenced within the product description or the product text may not be available in the ebook version **Introduction to Digital Signal Processing Using MATLAB with Application to Digital Communications** K.S. Thyagarajan, 2018-05-28 This textbook provides engineering students with instruction on processing signals encountered in speech music and wireless communications using software or hardware by employing basic mathematical methods The book starts with an overview of

signal processing introducing readers to the field It goes on to give instruction in converting continuous time signals into digital signals and discusses various methods to process the digital signals such as filtering The author uses MATLAB throughout as a user friendly software tool to perform various digital signal processing algorithms and to simulate real time systems Readers learn how to convert analog signals into digital signals how to process these signals using software or hardware and how to write algorithms to perform useful operations on the acquired signals such as filtering detecting digitally modulated signals correcting channel distortions etc Students are also shown how to convert MATLAB codes into firmware codes Further students will be able to apply the basic digital signal processing techniques in their workplace The book is based on the author's popular online course at University of California San Diego Quadrature Phase Shift Keying (QPSK/DQPSK). ,2007

Digital Communication Lab Manual Using Matlab Opsk: Bestsellers in 2023 The year 2023 has witnessed a noteworthy surge in literary brilliance, with numerous captivating novels captivating the hearts of readers worldwide. Lets delve into the realm of popular books, exploring the fascinating narratives that have captivated audiences this year. The Must-Read: Colleen Hoovers "It Ends with Us" This heartfelt tale of love, loss, and resilience has gripped readers with its raw and emotional exploration of domestic abuse. Hoover skillfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can triumph. Uncover the Best: Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This captivating historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids absorbing storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic: Delia Owens "Where the Crawdads Sing" This captivating coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens crafts a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These bestselling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of compelling stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a guiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a brilliant and suspenseful novel that will keep you speculating until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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Pelobatoidea The Pelobatoidea are a superfamily of frogs. They typically combine a toad-like body shape with a frog-like, pointed face Phylogenetically they stand ... European spadefoot toad The European spadefoot toads are a family of frogs, the Pelobatidae, with only one extant genus Pelobates, containing six species. They are native to Europe ... Pelobatidae They are collectively known as the "spadefoot toads" due to the presence of a keratinized "spade" on each hind foot which are used in burrowing. While all ... European Spadefoot Toads (Family Pelobatidae) The European spadefoot toads are a family of frogs, the Pelobatidae, with only one extant genus Pelobates, containing four species. ADW: Pelobatidae: INFORMATION Pelobatids are squat and toadlike, with soft skins and fossorial habits. This treatment places Megophryidae in a separate family, leaving but two or three ... Spadefoot Toads (Pelobatidae) Frogs in this family are often mistaken for toads (exemplified by the common name, "spadefoot toads"). They do not have the warty skin of true toads, however, ... Natural History of the White-Inyo Range Spadefoot Toads (Family Pelobatidae). Great Basin Spadefoot Toad, Spea ... A related species in southeastern California, the Couch's Spadefoot (Scaphiopus couchi) Couch's spadefoot (Scaphiopus couchi) Couch's spadefoot (Scaphiopus couchi). Order: Salientia Family: Pelobatidae (spadefoots) Other common name: spadefoot toad. Spanish names: sapo con espuelas ... Spadefoot toad | burrowing, nocturnal, desert 3 days ago — All spadefoot toads are classified in the family Pelobatidae. Spadefoot toads have a broad, horny "spade" projecting from the inside of each Pelobatidae - European Spadefoot Toad Family - Apr 21, 2017 — The family Pelobatidae is the European Spadefoot toads but they aren't just found in Europe, they are also found in Asia and Northern Africa. Read Unlimited Books Online Baldwin Wyplosz Pdf Book Pdf Read Unlimited Books Online Baldwin Wyplosz Pdf Book Pdf. INTRODUCTION Read Unlimited Books Online Baldwin Wyplosz Pdf Book Pdf Full PDF. The Economics of European Integration 6e ... Amazon.com: The Economics of European Integration 6e: 9781526847218: Baldwin, Richard, Wyplosz, Charles: Books. OverDrive: ebooks, audiobooks, and more for libraries and ... Free ebooks, audiobooks & magazines from your library. All you need is a public library card or access through your workplace or university. Baldwin & Co. READ, READ, READ, NEVER STOP READING, & WHEN YOU CAN'T READ ANYMORE... WRITE! Purchase Books Online. Purchase books on mystery, biography, young adult novels ... Answers to all your questions about the Kindle Unlimited ... Nov 21, 2023 — Kindle Unlimited is a distinct membership that offers members access to more than 4 million digital books, audiobooks, comics, and magazines. Offline Books - Read Unlimited on the App Store Once you have downloaded, you can read them offline. This application supports multiple languages. Easy, neat, light and intuitive book reader app! The Economics of European Integration 7e Aug 25, 2022 — The Economics of European Integration 7e. 7th Edition. 1526849437 · 9781526849434. By Richard Baldwin, Charles Wyplosz. © 2023 | Published ... E-Media and Digital Content We offer free access to digital books, music, movies, courses and more! To access content from our world-class e-media providers:. Baldwin Public Library | eBooks and eAudiobooks free with your library card. Download

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