

LAB 10

TTL and CMOS Logic Gates

Reading: Hayes and Horowitz, Class 13 and Lab 13.

Today you will be introduced to the circuits of digital electronics. We will start with some circuits made with discrete electronics to perform logical AND, OR and NOT functions. Next, properties of the most commonly used integrated circuit series, the LS-TTL and HC CMOS, are studied. Finally you will use these basic chips to construct more complex circuits.

1. Mickey Mouse Logic and the Totem Pole Output

These are among the simplest logic devices. They are useful in their own right from time to time. Also, they demonstrate the input circuitry to the most commonly used TTL chips, the low-power Schottky (LS-TTL) family. Here we use standard 1N914 signal diodes instead of the faster Schottky diodes used in LS-TTL gates.

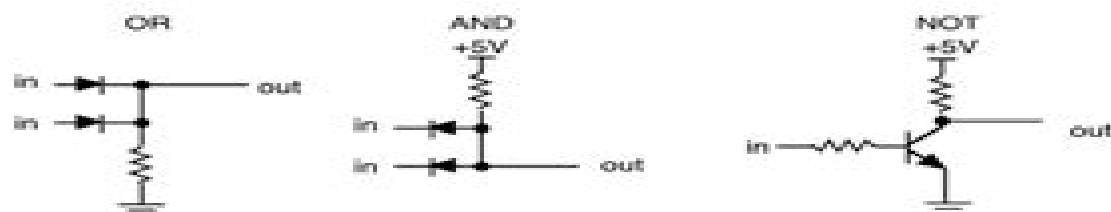


Fig 12.1

The AND circuit illustrated in Fig 12.1 is similar to the input of the 74LS00 NAND gates. Build it and confirm the logic function experimentally and record your results in a truth table. When you test this gate, use 0 V and 5 V for logical false and true.

TTL expects at least 2.0 V input for a high (true) input and guarantees at least 2.4 V for a high output. CMOS requires at least 3.5 V for a high input and delivers at least 4.9 V for high output. In what ways do these circuits disobey these criteria?

Lab Manual For Logic Gates In Cmos

Zhe Xu



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Digital Circuits Laboratory Manual Farzin Asadi, 2023-08-30 Digital systems are an important part of modern life This book introduces the basic building blocks of digital systems and how these blocks can be used to design a digital system It can be used as a laboratory manual for courses such as Digital Logic and Digital Electronics All of the experiments in this book can be done in a simulation environment like Proteus or NI MultiSim or on the breadboard in a real laboratory environment ELECTRONICS LAB MANUAL Volume I, FIFTH EDITION NAVAS, K. A., 2015-09-11 This lab manual is intended to support the students of undergraduate engineering in the related fields of electronics engineering for practicing laboratory experiments It will also be useful to the undergraduate students of electrical science branches of engineering and applied science This book begins with an introduction to the electronic components and equipment and the experiments for electronics workshop Further it covers experiments for basic electronics lab electronic circuits lab and digital electronics lab A separate chapter is devoted to the simulation of electronics experiments using PSpice Each experiment has aim components and equipment required theory circuit diagram tables graphs alternate circuits answered questions and troubleshooting techniques Answered viva voce questions and solved examination questions given at the end of each experiment will be very helpful for the students The purpose of the experiments described here is to acquaint the students with Analog and digital devices Design of circuits Instruments and procedures for electronic test and measurement

Digital Technology Lab Manual Webb R J Staff, 1988-12 **Digital Circuit Design Laboratory Manual, 4th edition (Global)** Akhan Almagambetov, J. Matt Pavlina, Yelena Mukhortova, **Lab. Manual for CSE/CSE-DS/ AIML/AIDS students-A Practical Manual** Dr. Rajiv Chopra, 2025-02-21 Lab Manual for CSE CSE DS AIML AIDS Students By Dr Rajiv Chopra This book serves as a comprehensive lab manual for B Tech students specializing in Computer Science Data Science Artificial Intelligence and Machine Learning Designed with a practical and experiment based approach it bridges the gap between theory and real world application Covering essential programming concepts AI ML techniques and hands on exercises this manual equips students with the skills needed for modern computing challenges Ideal for CSE IT ECE and related disciplines this book encourages students to explore experiment and apply their knowledge effectively in labs and projects Experiments Manual for Digital Electronics Roger L. Tokheim, 2003 *AN INTRODUCTION TO VLSI DESIGN AND TESTING* P. Brundavani, B. Abdul Raheem, Rachapudi Prabahakar, 2025-05-20 VLSI Design and Testing provides a concise yet comprehensive guide to the design analysis and testing of integrated circuits Covering key topics such as IC types Moore's Law MOSFET and CMOS fabrication and SOI technology the book builds a strong foundation in VLSI principles It explores the design flow CMOS logic gates layout techniques and both static and dynamic logic circuits Readers will also learn about circuit performance parameters scaling theory and subsystem design including adders shifters and comparators The book concludes with essential concepts in VLSI design styles FPGA gate array full custom and CMOS

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Laboratory Manual for Electronic Circuits - 3 Murat AKSOY,2018-10-02 *Fundamentals of Electrical and Electronics Engineering | AICTE Prescribed Textbook - English* Susan S. Mathew,Saji T. Chacko,2021-11-01 Fundamentals of Electrical Electronics Engineering is a compulsory paper for the first year Diploma course in Engineering Technology Syllabus of this book is strictly aligned as per model curriculum of AICTE and academic content is amalgamated with the concept of outcome based education Books covers six topics Overview of Electronics Components and Signals Overview of Analog Circuits Overview of Digital Electronics Electric and magnetic Circuits A C Circuits and Transformer and Machines Each topic is written in easy and lucid manner A set of exercises at the end of each unit to test the student's comprehension is provided Some salient features of the book | Content of the book aligned with the mapping of Course Outcomes Programs Outcomes and Unit Outcomes | The practical applications of the topics are discussed along with micro projects and activities for generating further curiosity as well as improving problem solving capacity | Book provides lots of vital facts concepts principles and other interesting information | QR Codes of video resources and websites to enhance use of ICT for relevant supportive knowledge have been provided | Student and teacher centric course materials included in book in balanced manner | Figures tables equations and comparative charts are inserted to improve clarity of the topics | Objective questions and subjective questions are given for practices of students at the end of each unit Solved and unsolved problems including numerical examples are solved with systematic steps

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Lab Manual to Accompany Tocci's Digital Systems, Principles and Applications, 3/E Jim C. DeLoach,1985 **Microelectronics Education** Ton J. Mouthaan,Cora Salm,2012-12-06 Dear participant in the second European Workshop on Microelectronics Education It is a pleasure to present you the Proceedings of the Second European Workshop on Microelectronics Education and to welcome you at the

Workshop The Organising Committee is very pleased that it has found several key persons with highly appreciated levels of knowledge and expertise willing to present Invited Contributions to this Workshop We have striven for an interesting spread over important areas like the expected demands for educated engineers in the wide field of Microelectronics and Microsystems in European industry and beyond and innovations in method and focus of our educational programmes This is the second European Workshop in this area the first one was held in Grenoble in France in the spring of 1996 It was the initiative of Georges Kamarinos Nadine Guillemot and Bernard Courtois to organise this Workshop because they felt that Microelectronics was at a turning point to become the core of the largest industry in the world and that this warranted a serious re consideration of our educational imperatives It is now two years since and their feeling has become reality nobody doubts that by the year 2000 the microelectronics industry will be the largest industrial sector It is also obvious that because of that and because of the predicted shortfall of educated engineers we must continuously reconsider the quality of our educational approach Analog Design Issues in Digital VLSI Circuits and Systems Juan J. Becerra, Eby G.

Friedman, 2012-12-06 Analog Design Issues in Digital VLSI Circuits and Systems brings together in one place important contributions and up to date research results in this fast moving area Analog Design Issues in Digital VLSI Circuits and Systems serves as an excellent reference providing insight into some of the most challenging research issues in the field

Logic-timing Simulation and the Degradation Delay Model Manuel J. Bellido, Jorge Juan Chico, Manuel Valencia, 2006 This book provides the reader with an extensive background in the field of logic timing simulation and delay modeling It includes detailed information on the challenges of logic timing simulation applications advantages and drawbacks The capabilities of logic timing are explored using the latest research results that are brought together from previously disseminated materials An important part of the book is devoted to the description of the Degradation Delay Model developed by the authors showing how the inclusion of dynamic effects in the modeling of delays greatly improves the application cases and accuracy of logic timing simulation These ideas are supported by simulation results extracted from a wide range of practical applications Sample Chapter s **Lab Manual Troubleshooting and Design to Accompany Digital Systems** Frank J. Ambrosio, 1997

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