高等学校规划教材・电子、通信及自动控制技术

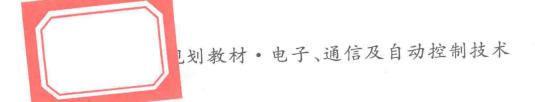
PROGRAMMING TEXTBOOKS FOR HIGHER EDUCATION

Modern Digital Electronics— Instructor⁹ s Manual

《现代数字电子学》教学指导书(英文版)

谢松云 主编

西北乙業大學出版社



Modern Digital Electronics — Instructor's Manual 《现代数字电子学》教学指导书 (英文版)

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【内容简介】 本书根据数字电子技术双语教学需求,对教材和教学中用到的专业英语词汇进行汇总,分别编写了英-中和中-英专业术语对照表,并对典型习题进行了分析和精解,便于教师和学生查找专业词汇和对习题的理解,也便于学生自学。全书内容包括三大部分:英中专业术语对照表、中英专业术语对照表和典型习题解析。为了便于读者阅读外文教材,书中采用了目前国际上流行的图形逻辑符号。

本书可作为高等院校数字电子技术类双语教学的辅助教材,适合计算机、电子、通信、自动化等专业本专科学生的双语教学使用,也可作为其他各种类型的工程技术人员学习数字电子技术类英语的教材。

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前言

改革开放以来,大学的国际化要求愈发高涨,电子技术双语化教学是适应这一趋势,在大学日趋推广的新的教学方式。越来越多的高等院校开设了数字电子技术双语(中、英语)课程。为了适应当前教育事业改革与发展的趋势,满足广大利用双语学习电子技术课程读者的需要,我们特地编写了本书。

目前数字电子技术类的辅导书很多,对中文教学有较大的参考价值,但适合做双语教学的教材比较少,特别是教学辅助教材极少,本书在吸收了传统辅导教材的优点的基础上,突出了双语教学的特色,适合作为数字电子技术基础类双语教学中学生辅助学习和讲课教师参考用书。本书是配合 R. P. Jain 主编的《现代数字电子学(第 3 版)》而编写的教学指导书,主要内容包括英中专业术语对照表、中英专业术语对照表、课后习题分析与答案。主要有以下特点:

- (1)双向专业术语的对照:给出了英-中、中-英术语的对照,方便了查询。
- (2)解释细致:在两种对照表后都附有英语的详细解释,一方面方便了对专业英语的学习掌握,另一方面可以使学生更深入地了解专业知识。
- (3)习题解析精细:习题选择是十分典型的,解题过程概念清晰、步骤完整,数据准确、附图 齐全,利于培养学生科学的思维方法,掌握答题的思维技巧和教师讲授。本书填补了数字电子 技术类双语教学辅助教材的空缺,有利于推进这方面教学改革的进展。

本书是西北工业大学规划教材,可作为大学本、专院校电子专业学生数字电子类课程双语教学的参考书。

本书由西北工业大学谢松云教授担任主编,由谢松云教授、吴俊副教授、李毅工程师合作编写。在编写过程中,李宁飞、吕卓、赵金、党正、何华兵、王颖、张万鹏、乔文静、李红润等协助进行了书稿录入和绘图等大量工作,在此向他们表示真诚的感谢!对于本书选用的参考文献的著作者致以诚挚的谢意!

由于水平有限及编写时间仓促,不妥之处在所难免,希望广大读者不吝批评指正。

编者

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Part I: Glossary from English to Chinese

第一部分:英中专业术语对照表

Chapter 1

Active-high input

高电平输入

The input terminal is active (or enabled) when held at HIGH logic level.

Active-high output

高电平输出

The output terminal is at HIGH logic level when active(or enable).

Active-low input

低电平输入

The input terminal is active (or enabled) when held at LOW logic level.

Active-low output

低电平输出

The output terminal is at LOW logic level when active(or enable).

Analog circuit

模拟电路

An electronic circuit that processes analog signals.

Analog signal

模拟信号

A continuous signal that can have any value in a given range. It is also known as analog signal.

Analog system

模拟系统

An electronic system that consists of analog circuits and/or devices.

AND gate

与门

A logic circuit whose output is 1 if and only if all its inputs are 1.

AND

与

A logic whose output is 1 if and only if all its inputs are 1.

AND-NOR

与或非

A two-level realization of logic functions that has AND gates in the first level and an NOR gate in the second level.

Binary

二进制

Having two states.

Binary number system

二进制数系统

A number system with base (or radix) 2, i. e. only two symbols 0 and 1 are used to

represent any number.

Binary variable

二进制变量

A variable that can have only two values 0 and 1.

Bit

二进制位

A binary digit 0 or 1.

Boolean algebra

逻辑代数、布尔代数

The algebra of binary variables.

Boolean function

布尔函数

A well defined relationship between binary variables specified by either a Boolean equation or truth table.

Boolean variable

布尔变量

Same as the binary variable.

Bubble

反变化圈

A small circle indicating inversion operation or active-low condition.

Chip

芯片

A piece of silicon (or any semiconductor material) on which an integrated circuit is fabricated.

Computer

计算机

An electronic digital system that processes data. See also digital computer.

Decimal

十进制

Having ten states.

Digital circuit

数字电路

An electronic circuit that processes digital signals

Digital computer

数字计算机

A programmable digital system capable of performing various arithmetic and logical operations.

Digital electronics

数字电子技术

Branch of electronics which deals with the digital devices, circuits and systems.

Digital signal

数字信号

A signal with only two discrete values. These are usually represented by LOW and HIGH or 0 and 1.

Digital system

数字系统

An electronic system consisting of digital circuits and/or devices.

DIP(Dual-in-line package)

双列直插式封装

A semiconductor chip package having two rows of pins perpendicular to the edges of the package.

Disable

禁止

Prohibits an activity from proceeding or output(s) to be produced in a digital circuit. Also known as INHIBIT.

Dual

Two Boolean functions are said to be dual of each other if any one of these is obtained from the other one by(||) interchanging + and • signs, and (||) interchanging 0 and 1.

Enable 使能

Allows activity to proceed or output(s) to be produced in a digital circuit.

双

Excess-3 code 余 3BCD 码

A BCD code formed by adding 3(0011) to the binary equivalent of the decimal number.

EX-NOR(Exclusive-NOR) gate 异或非门(同或)

A two input gate that produces a high output only when both the inputs are same.

EX-OR(Exclusive-OR) gate 异或门

A two input gate whose output is logic 0 when both the inputs are equal and logic 1 when they are unequal.

False 假(逻辑 0)

One of the states of a logic circuit, the other state is True.

FLIP-FLOP 触发器

It is a basic memory element in digital systems. It is same as bistable multivibrator.

Gate 门电路

A logic circuit in which the output depends upon the inputs according to some logic rules.

Hexadecimal 十六进制

Having sixteen states.

High level 高电平

The voltage corresponding to logic 1.

IC package 集成电路组件

An integrated circuit chip packaged as a single multilead component. For example DIP.

Inhibit 禁止

Same as disable.

Integrated circuit(IC) 集成电路

A same semiconductor chip containing several electronic circuits.

Inversion 反演

The process of complementing a logic signal.

Inversion circle 反变化圈

Same as bubble.

Inverter 反相器

A logic gate whose output is the complement of its input.

Logic circuit 逻辑电路

An electronic circuit that operates on digital signals in accordance with a logic function.

Logic diagram 逻辑图

A graphical representation of a program using formal logic.

Logic family

逻辑系列

A group of logic circuits built around a standardized integrated circuit technology.

Logic gate

逻辑门

Same as gate.

Logic variable

逻辑变量

Same as binary variable.

Low-level

低电平

The voltage corresponding to logic 0.

Logic operation

逻辑运算

An operation that follows the rules of symbolic logic.

Memory

存储器

A device that stores binary information.

Microprocessor

微处理器

A semiconductor IC chip with the capabilities of CPU of a computer.

NAND

与非

A logic whose output is logic 0 if and only if all of its inputs are logic 1.

NAND gate

与非门

A logic gate whose output is logic 0 if and only if all of its inputs are logic 1.

Negative logic system

负逻辑系统

Logic system in which the lower of the two levels is represented by 1 and the higher level is represented by 0.

Noise

噪声

Unwanted electrical signals which are random in nature.

NOR

或非

A logic whose output is logic 1 if and only if all of its inputs are logic 0.

NOR gate

或非门

A logic gate whose output is logic 1 if and only if all of its inputs are logic 0.

NOT

韭

If input is 0 (1), the output is 1 (0).

NOT gate

非门

Same as inverter.

OFF

关闭(逻辑 0)

One of the states of a logic circuit, the other state is ON.

ON

打开(逻辑 1)

One of the states of a logic circuit, the other state is OFF.

OR

或

A logic whose output is 0 if and only if all its inputs are 0.

OR gate

口, 和

A logic gate whose output is logic 0 if and only if all its inputs are logic 0.

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Positive logic system

正逻辑系统

Logic system in which the higher of the two levels is represented by 1 and the lower level is represented by 0.

Programmable ICs

可编程集成电路

ICs which can be programmed for desired purpose by a user.

Switching speed

转换速度

Speed with which an electronic switch can change from ON to OFF and vice versa. It is usually expressed in terms of the propagation delay time.

True

真(逻辑1)

One of the states of logic circuit, the other state is False.

Truth table

真值表

A table that gives outputs for all possible combinations of inputs to a logic circuit.

Universal gate

通用门

A gate that can perform all the basic logical operations, such as NAND, and NOR.

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Chapter 2

Alphanumeric codes

字母数字代码

Codes that represent numerals, alphabets (letters) and other usual symbols, for example, ASCII code.

ASCII code (American Standard Code for Information Interchange) ASCII 码(美国信息交换标准码): A 7-bit code widely used in computers and related areas for representation of alphanumeric characters and special symbols.

Base (or Radix) of a number system 数字系统的基数

The number of distinct symbols (digits) used in a number system.

BCD (Binary-Coded Decimal)

二-十进制码

A code for representing decimal numbers is which each decimal digit is represented by its 4-bit binary code Natural BCD.

Byte

字节

A group of eight bits.

Code

码

A system of representation of numeric, alphabets or special characters in a binary form for processing and transmission using digital techniques.

Complement

补码

Inversion of the value of a binary number, variable, or expression.

Complementation

求余

The process of determining complement of a binary number, variable, or expression.

Decimal number system

十进制数字系统

A number system with base (or radix) 10. The ten digits used to represent any number are 0,1,2,3,4,5,6,7,8, and 9.

Encoding

编码

The process of coding alphabets, numerals and symbols in binary format.

Error correcting code

误差校正码

A code used for correction of error in the transmission of digital signals.

Error detecting code

误差检测码

A code used for detection of error in the transmission of digital signals.

Even parity

偶校验

A digital word (string of 0s and 1s) having an even number of ones.

Excess-3 code

余3码

A BCD code formed by adding 3(0011) to the binary equivalent of the decimal number.

Gray code 格雷码

A code in which only one bit changes between successive numbers.

HEX

十六进制

Abbreviation for hexadecimal.

Hexadecimal code

十六进制码

A method of representing binary numbers in which each group of 4 bits (starting from the right most bit) is represented by its hex digit.

Hexadecimal number system

十六进制系统

A number system that uses digits 0 through 9 and the alphabets A through F. Its base (or radix) is 16.

Least-significant bit (LSB)

最低有效位

The right-most bit of a binary number. It has the least weight.

Least-significant digit (LSD)

最低有效数字

The right most digit of a number.

Most-significant bit (MSB)

最高有效位

The left-most bit of a binary number.

Most-significant digit (MSD)

最高有效数字

The left-most digit of a number.

Natural BCD

自然二-十进制码

BCD representation that uses natural binary numbers.

Nibble

半字节

A group of four bits.

Nine's complement

十进制反码

Nine's complement of an N-digit-decimal number is the number obtained by subtracting it from an N-digit number consisting of all 9's.

Octal code

八进制码

A code in which each group of three bits starting from LSB is represented by its equivalent octal digit.

Octal number system

八进制系统

A number system with base (or radix) 8 that uses digits 0,1,2,3,4,5,6, and 7.

Odd parity

奇校验

A digital word having an odd number of ones.

One's complement

反码

The number obtained by complementing each bit of a binary number.

One's complement representation

反码表示

A binary representation used for representing positive as well as negative numbers (signed numbers).

Parity

奇偶性

A term used to specify the number of ones in a digital word as odd or even,

Parity bit

校验位

An extra bit attached to a binary word.

Parity generator

奇偶发生器

A logic circuit that generates an additional bit which when appended to a digital word makes its parity as desired (odd or even)

Positional number system

基于位权的数字系统

A number system in which value of a digit depends upon its position in the number.

Radix

基数

Same as the base.

Sign bit

符号位

The MSB of a signed binary number. If 0, the number is positive, when it is 1, the number is negative.

Signed binary number

带符号二进制数

A binary number that is either positive or negative.

Sign-magnitude representation

符号大小法

A representation system for signed binary numbers in which the MSB represents the sign and the remaining bits represent the magnitude of the number.

Two's complement

补码

Binary number obtained by adding one to the one's complement of a binary number.

Two's complement representation

补码表示

A method of representation of binary number in which negative numbers are represented by two's complement of their positive equivalents.

Weighted code

加权码

A binary code in which weight is assigned to each position in the number.

Word

字

A group of bits.

Chapter 3

Cut-off

截止

State of a transistor when its collector (or drain) current is zero.

Packaging density

封装密度

It is a measure of components that can be fabricated on a chip.

Relay

继电器

An electromechanical switch.

Saturation

饱和

State of a transistor when its collector (or drain) current is maximum and V_{ce} or $V_{ds}{\approx}0$.

Speed of operation

操作速度

It is a measure of the speed at which a digital circuit operates. It is specified as propagation delay time.

Yield

成品率

The percentage of acceptable ICs resulting from a manufacturing process.

Chapter 4

Active pull-up

有源上拉

A circuit with active devices used to pull up the output voltage of a logic circuit from LOW to HIGH in response to the appropriate inputs.

Analog switch

模拟开关

The analogue (or analog) switch, also called the bilateral switch, is an electronic component that behaves in a similar way to a relay, but has no moving parts. The switching element is normally a MOSFET transistor. The control input to the switch is a standard CMOS or TTL logic input, which is shifted by internal circuitry to a suitable voltage for switching the MOSFET. The result is that a logic 0 on the control input causes the MOSFET to have a high resistance, so that the switch is off, and a logic 1 on the input causes the MOSFET to have a low resistance, so that the switch is on.

Base

基极

The region in a transistor between the emitter and the collector.

Bipolar logic

双极性逻辑

Logic circuits using bipolar junction semiconductor devices.

Breadth of logic family

宽度逻辑序列

The number of different types of gates and other functions available in an IC logic family.

Buffer

缓冲器

A circuit or gate that can drive a substantially higher number of gates or other loads. Also known as Buffer driver.

Bus

总线

A group of conductors carrying a related set of signals.

Circuit components

电路组成

Components of an electrical circuit or electronic circuit can be connected in many different ways.

Clamping diode

钳位二极管

An electronic circuit that prevents a signal from exceeding a certain defined magnitude by shifting its DC value.

CMOS (Complementary Metal-Oxide Semiconductor)

互补型金属氧化物半导体

A MOS device that uses one p-channel one n-channel device to make an inverter circuit.

Collector

集电极

The region in a transistor into which charge carriers flow from the base.

Current sink logic

灌电流逻辑

A logic circuit in which the output sink current corresponding to logic 0 state is appreciably higher than the output source current corresponding to logic 1 state.

Current source logic

电流源逻辑

A logic circuit in which the output sink current corresponding to logic 1 state is appreciably higher than the output sink current corresponding to logic 0 state.

Cut off

截止

The value of voltage, frequency, etc., below or above which an electronic device cannot function efficiently.

DCTL (Direct-coupled Transistor Logic)

直接耦合晶体管逻辑

A form of bipolar logic that uses direct coupling.

Depletion mode MOSFET

耗尽型金属氧化物半导体场效应晶体管

A MOS device in which channel width gets depleted when the voltage of proper polarity is applied at the gate.

DTL (Diode Transistor Logic)

晶体二极管逻辑电路

A form of bipolar logic circuit that uses diodes and bipolar junction transistors to realize a logic operation.

ECL (Emitter-Coupled Logic)

射极耦合逻辑电路

A form of bipolar logic circuit that uses emitter-coupled configuration.

Emitter

发射极

The region in a transistor in which the charge-carrying holes or electrons originate.

Emitter-coupled

发射极耦合

A logic family that achieves high speed by using an overdriven BJT differential amplifier with single-ended input, whose emitter current is limited to avoid the slow saturation region of transistor operation.

Enhancement mode MOSFET

增强型场效应管

A MOS device in which the channel is formed only when a proper voltage is applied at the gate. The channel width enhances with the increased voltage at the gate.

Fan-in

扇入(输入逻辑门电路)

The number of inputs of a logic gate.

Fan-out

扇出

The maximum number of similar logic gates which can be driven by a logic gate.

Field-effect transistor (FET)

场效应晶体管

A three terminal semiconductor device in which the current flow is due to the flow of one type of charge carriers only. The current in the channel is controlled by the field produced due to the applied voltage at the gate.

Figure of merit (of digital ICs)

优值系数(品质因数)

It is the product of speed expressed as propagation delay time and power dissipation. It is also known as the speed power product.

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