

University of Babylon
College of Education for Pure Sciences
Department of Physics
Third Class, Second Course.

Digital Electronics

Chapter 1. Number Systems and Codes

Digital concepts, digital and analogy quantities, binary digits, logic levels, and digital waveforms, basic logic operations, digital system application, Decimal numbers, binary numbers, decimal-to-binary conversion, hexadecimal numbers, octal numbers.

Chapter 2. Logic Gates

Introduction, Digital signals and gates, the AND gate, the OR gate, the NAND gate, the NOR gate, the exclusive-OR and exclusive-NOR Gates.

Chapter 3. Boolean Algebra

Introduction, Boolean arithmetic, Boolean algebraic identities Boolean algebraic properties, Boolean rules for simplification, Circuit simplification example, De Morgan's theorem, Converting truth table into Boolean expression.

Chapter 4. Karnaugh Mapping

Introduction, Karnaugh maps, truth tables and Boolean expression.

Chapter 5. Digital Arithmetic

Introduction, Binary addition, Multiplication of binary numbers, Addition of DCB numbers, Addition and subtraction of hexadecimal numbers.

Chapter 6.: Combinatory Logic

Introduction, principle of addition in digital systems, basic adders, the subtractor, the comparator, the decoder, the encoder, the transcoder, the multiplexer, the demultiplexer.

Chapter 7. Multivibrators

Introduction, multivibrators, Latches, edge-triggered flip-flops, flip-flop operating characteristics, flip-flop applications.

Chapter 8. Counters

Introduction, Asynchronous counters, synchronous counter operation, Counter modulus, Advantages and disadvantages of asynchronous counters, shift registers.

Chapter 9. Memory and Storage

Introduction, General structure of digital storage systems, Terms and concepts related to digital storage, Technologies of semiconductor memories, Technologies of bipolar memories, Technologies of MOS memories, read-only memories (ROMs), random-access memories (RAMs).

Textbook

- 1- Thomas L. Floyd, **Digital Fundamentals**, Pearson Education, Inc., Upper Saddle River, New Jersey, 11th edition, 2015.

References

- 1- Anil K. Maini, **Digital electronics: principles, devices, and applications**, John Wiley & Sons Ltd, 2007.
- 2- Tertulien Ndjountche, **Digital Electronics 1: Combinational Logic Circuits**, ISTE Ltd and John Wiley & Sons, Inc, 2016.
- 1- J. Crowe, B. Hayes-Gill, **Introduction to Digital Electronics**, Copyrighted Material 1998.