

ELEI 204

DIGITAL CIRCUIT FUNDAMENTALS

4 Semester Hours

The Community College of Baltimore County

Description

Digital Circuit Fundamentals

Discusses theory and operation of the basic building blocks of digital circuitry with emphasis on TTL and CMOS integrated circuit logic families; prepares for continued study of theory and operation of microprocessors and microcomputers. Three hours of lecture and one two hour lab a week one semester.

Prerequisite: MATH 108

Overall Course Objectives.

Upon completion of this course the student will be able to:

Demonstrate in written and oral presentations a basic understanding of digital terminology, digital components, and systems. Demonstrate a working knowledge through a laboratory setting of the theory as it is applied to a work situation. Explain the difference between digital and analog systems. Explain the basics of Boolean logic operations. Evaluate logic circuit outputs, describe the operation of logic gates, write truth tables for logic gates. Convert to and from the following number bases, decimal, binary, octal, and hexadecimal. Explain the operation of flip flops, D-Flip-Flop, J-K Flip-Flop, Flip-Flop used as a shift register. Explain the operation of asynchronous counters. Explain the operation of synchronous counters. Explain the operation of encoders, decoders, multiplexers, shift registers, and wave generating circuits.

Major Topics

Digital and analog systems, digital number systems, digital circuits. Number systems and codes, binary-to-decimal and decimal-to-binary conversions, octal number system, hexadecimal number system, binary and alphanumeric codes. Logic gates and Boolean Algebra, Boolean constants and variables, truth tables, OR, AND, and NOT gates, NOR and NAND gates. Boolean theorems, DeMorgans theorem. Combinational logic circuits, exclusive-OR (XOR), exclusive-NOR (XNOR). Flip-Flops, set-clear flip-flops, toggle flip-flops, J-K flip-flop, D flip-flop, master-slave flip-flops. Asynchronous inputs, sequential circuits, the one-shot multivibrator, Digital arithmetic operations and circuits, binary addition and subtraction. The Complement System of addition and subtraction, half adder, full adder, BCD addition. MSI Logic Circuits, encoders, decoders, multiplexers, demultiplexers. Counters and Registers, ripple counters, modified modulus counters, synchronous counters, up/down counters, pre-settable counters, D to A converters, A to D converters, and sample and hold circuits.

Course Requirements

The instructor will administer Exams (60%), Lab assignments (30%), other assignments (10%).

Other Course Information

Additional information about this course or any other Industrial electricity/electronics course may be obtained by contacting the IEE/Telecommunications Program Director.