Western Technical College

10660131 Digital Fundamentals

Course Outcome Summary

Course Information

Description	This course introduces the concepts of digital logic. Digital number systems and basic logic gates are covered. Emphasis is placed on providing a foundation for the application of digital logic to the use of digital applications such as D/A - A/D converters and programmable logic controllers.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	1
Total Hours	27

Textbooks

No textbook required.

Program Outcomes

1. Problem-solve electronic circuits and systems.
2. Demonstrate safety precautions and practices with medical equipment.

Course Competencies

1. Compare analog and digital quantities.

Assessment Strategies

1.1. Written Objective Test

Criteria

You will know you are successful when

1.1. you describe the different characteristics of analog and digital quantities.
1.2. you list examples of analog and digital quantities.
1.3. you explain the need to represent analog quantities in digital form.

Learning Objectives

1.a. List examples of analog quantities.

1.b. List examples of digital quantities.
1.c. Describe the difference between analog and digital quantities.
1.d. Explain the need to represent analog quantities in digital form.

2. Analyze digital number systems.

Assessment Strategies

2.1. Written Objective Test

Criteria

You will know you are successful when

2.1. you define the terms bit, byte, word, least significant bit and most significant bit as they apply to binary memory locations.
2.2. you compare the binary, decimal, hexadecimal & BCD number systems.
2.3. you add and compare binary numbers.
2.4. you convert quantities between binary, decimal, BCD & hexadecimal number systems.

Learning Objectives

2.a. Compare the binary, decimal, hexadecimal & BCD number systems.
2.b. Convert quantities between binary, decimal, BCD & hexadecimal number systems.
2.c. Define the terms bit, byte, word, least significant bit and most significant bit as they apply to binary memory locations.
2.d. Add and compare binary numbers.

3. Analyze basic digital logic gates.

Assessment Strategies

3.1. Lab Demonstration
3.2. Written Objective Test

Criteria

You will know you are successful when

3.1. you describe the operation of the seven basic logic gates.
3.2. you develop the Boolean equation for the seven basic logic gates.
3.3. you complete the output Truth Table for the seven basic logic gates.
3.4. you build single gate logic circuits using the seven basic logic gates.
3.5. you use appropriate instrumentation to test basic logic gate circuits to verify predicted values.

Learning Objectives

3.a. Describe the operation of the INVERTER, AND and OR logic gates.
3.b. Describe the operation of the NAND and NOR logic gates.
3.c. Describe the operation of the EXCLUSIVE OR and EXCLUSIVE NOR logic gates.
3.d. Develop the Boolean equation for the INVERTER, AND and OR logic gates.
3.e. Develop the Boolean equation for the NAND and NOR logic gates.
3.f. Develop the Boolean equation for the EXCLUSIVE OR and EXCLUSIVE NOR gates.
3.g. Complete the output Truth Table for the INVERTER, AND and OR logic gates.
3.h. Complete the output Truth Table for the NAND and NOR logic gates.
3.i. Complete the output Truth Table for the EXCLUSIVE OR and EXCLUSIVE NOR logic gates.
3.j. Build and test single gate logic circuits utilizing INVERTER, AND and OR logic gates.
3.k. Build and test single gate logic circuits utilizing NAND and NOR logic gates.
3.l. Build and test single gate logic circuits utilizing EXCLUSIVE OR and EXCLUSIVE NOR logic gates.

4. Develop combinational logic circuits utilizing basic logic gates.

Assessment Strategies

4.1. Lab Demonstration
4.2. Written Objective Test

Criteria

You will know you are successful when

4.1. you convert between a relay ladder logic diagram and a gate logic representation.
4.2. you write Boolean equations for combinational logic circuits.

4.3. you draw a combinational logic circuit corresponding to a Boolean equation.
4.4. you build combinational logic circuits developed from a Boolean equation.
4.5. you use appropriate instrumentation to test combinational logic gate circuits to verify predicted values.
4.6. you design, develop, and test a simple combinational logic circuit that represents a real world industrial application.

Learning Objectives

4.a. Write Boolean equations for combinational logic circuits.
4.b. Draw a combinational logic circuit corresponding to a Boolean equation.
4.c. Build and test combinational logic circuits developed from a Boolean equation.
4.d. Convert between a relay ladder logic diagram and a gate logic representation.
4.e. Design, develop and test a simple combinational logic circuit that represents a real world industrial application.