

Programmable Logic Controllers 5th edition
Petruzella Test Bank

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Chapter 03 Test Bank KEY

1. The decimal system uses the number 9 as its base.

FALSE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

2. All digital computing devices perform operations in binary.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Units: Imperial

3. The base of a number system determines the total number of unique symbols used by that system.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

4. In any number system, the position of a digit that represents part of the number has a weighted value associated with it.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

5. Usually a group of 8 bits is a byte, and a group of one or more bytes is a word.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

6. To express a number in binary requires fewer digits than in the decimal system.

FALSE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

7. The octal number system consists of digits 0, 1, 2, 3, 4, 5, 6, and 7. There are no 8s or 9s.

TRUE

Accessibility: Keyboard Navigation

Bloom's: Object 1. Factual

Bloom's: Verb 1. Remember

Difficulty: Easy

Gradable: automatic

Learning Objective: Know the characteristics of the numbering system codes

Section: 03.04 Octal System

Subtopic: Number System Characteristics

Topic: Number Systems and Codes

Units: Imperial

8.

8. The hexadecimal number system consists of 16 digits including the numbers 0 through 9 and letters A through F.

TRUE

Accessibility: Keyboard Navigation

Bloom's: Object 1. Factual

Bloom's: Verb 1. Remember

Difficulty: Easy

Gradable: automatic

Learning Objective: Know the characteristics of the numbering system codes

Subtopic: Number System Characteristics

Topic: Number Systems and Codes

Units: Imperial

9. In the Gray code there is a maximum of one bit change between two consecutive numbers.

TRUE

Accessibility: Keyboard Navigation

Bloom's: Object 1. Factual

Bloom's: Verb 1. Remember

Chapter: 03 Number Systems and Codes

Difficulty: Medium

Gradable: automatic

Learning Objective: Know the characteristics of the numbering system codes

Section: 03.07 Gray Code

Subtopic: Number System Characteristics

Topic: Number Systems and Codes

Units: Imperial

10. The radix of a number system is the same as the base.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

11. Binary number systems use positive and negative symbols to represent the polarity of a number.

FALSE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.03 Negative Numbers
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

12. The decimal system has as its base:

- A. 2.
- B. 5.
- C. 8.
- D.** 10.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

13. Which of the following number systems has a base of 16?

- A.** Hexadecimal
- B. Octal
- C. Binary-coded decimal
- D. Gray code

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.05 Hexadecimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

14. In any number system, the position of a digit that represents part of the number has a "weight" associated with its value. The place weights for binary:

- A. start with 1 and are successive powers of 2.
- B. increase by adding 2 for each place, starting with 0.
- C. increase by adding 2 for each place, starting with 2.
- D. start with 2 and double for each successive place.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

15. The number 12 is:

- A. 12 in any number system.
- B. 12 in decimal.
- C. 12 in binary.
- D. All of these choices are correct

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

16. The decimal number 15 would be written in binary as:

- A. 1111.
- B. 1000.
- C. 4C.
- D. 00011001.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

17. The binary number 101 has the decimal equivalent of:

- A. 3.
- B. 101.
- C. 41.
- D. 5.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.02 Binary System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

18. The number 127 could *not* be:

- A. decimal.
- B. hexadecimal.
- C. octal.
- D.** binary.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.02 Binary System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

19. The octal number 153 would be written in binary as:

- A. 011 101 001.
- B.** 001 101 011.
- C. 011 111 101.
- D. 010 100 011.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.04 Octal System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

20. The binary number 101101 would be written in decimal as:

- A. 21.
- B. 36.
- C. 45.**
- D. 62.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.02 Binary System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

21. The decimal number 28 would be written in binary as:

- A. 11100.**
- B. 00111.
- C. 10110.
- D. 01011.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.02 Binary System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

22. The octal number 62 would be written in decimal as:

- A. A12.
- B. F35.
- C.** 50.
- D. 98.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.02 Binary System
Section: 03.04 Octal System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

23. The hexadecimal number C4 would be written in decimal as:

- A. 21.
- B. 48.
- C. 182.
- D.** 196.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.04 Octal System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

24. The hexadecimal number 2D9 would be written in binary as:

- A. 0010 1101 1001.
- B. 1001 1011 0010.
- C. 1100 1111 0010.
- D. 0010 1011 1001.

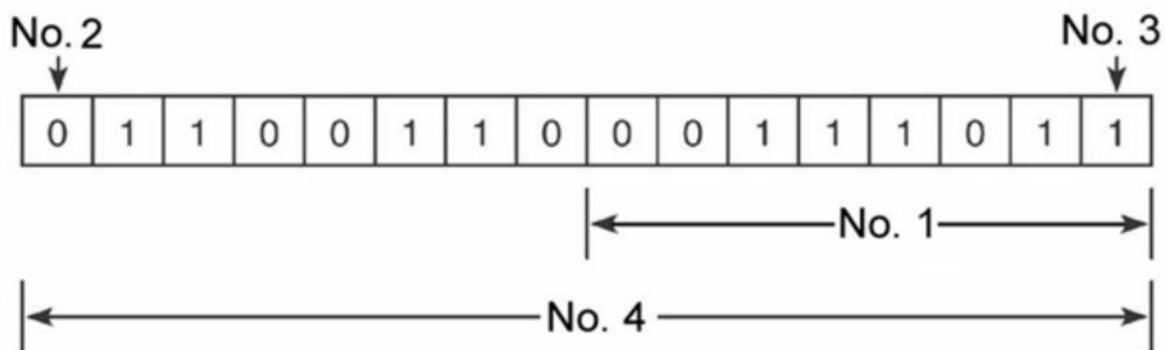
Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.04 Octal System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

25. The decimal number 213 would be written in BCD as:

- A. 0010 0001 0011.
- B. 1101 1000 1100.
- C. 0111 1001 0011.
- D. 1011 1101 0101.

Accessibility: Keyboard Navigation
Bloom's: Object 3. Procedural
Bloom's: Verb 3. Apply
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Convert from one numbering or coding system to another
Section: 03.06 Binary Coded Decimal (BCD) System
Subtopic: Number Conversions
Topic: Number Systems and Codes
Units: Imperial

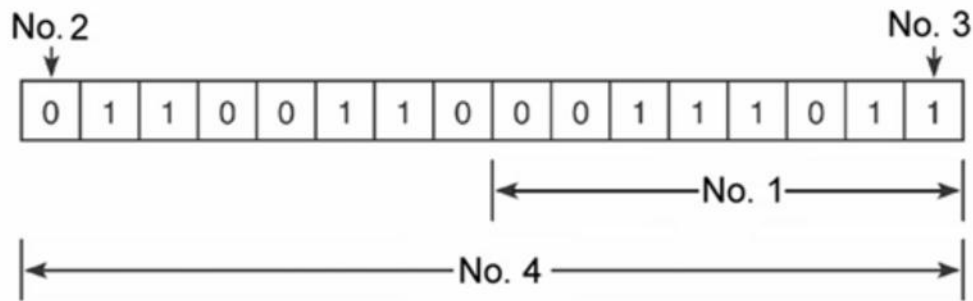
26. One byte of the data shown is represented by:



- A. No. 1.
- B. No. 2.
- C. No. 3.
- D. No. 4.

*Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial*

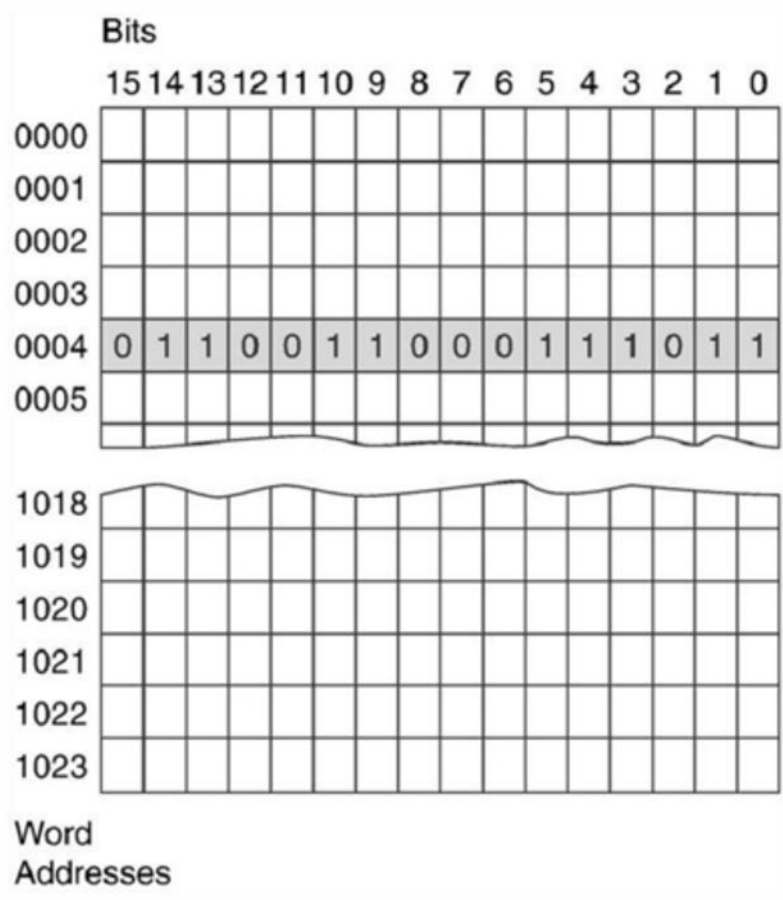
27. The MSB of the data shown in Figure 3-1 is represented by



- A. No. 1.
- B.** No. 2.
- C. No. 3.
- D. No. 4.

Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

28. The memory size represented is:



- A. 1023 K.
- B. 1000 K.
- C. 500 K.
- D. 1 K.

Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

29. The main advantage of using the Gray code is:

- A. only one digit changes as the number increases.
- B. it can be easily converted to decimal numbers.
- C. large decimal numbers can be written using fewer digits.
- D. it uses the number 2 as its base.

Accessibility: Keyboard Navigation
Bloom's: Object 2. Conceptual
Bloom's: Verb 2. Understand
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.07 Gray Code
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

30. The acronym BCD stands for:

- A. binary-coded decimal.
- B. binary code decoder.
- C. base code decoder.
- D. base-coded decimal.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.06 Binary Coded Decimal (BCD) System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

31. For a base 8 number system, the *weight value* associated with the third digit would be:

- A. 16.
- B. 32.
- C. 64.
- D. 512.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.04 Octal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

32. All digital computing devices operate using the binary number system because:

- A. most people are familiar with it.
- B. large decimal numbers can be represented in a shorter form.
- C. digital circuits can be easily distinguished between two voltage levels.
- D. All of these choices are correct

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

33. If a given memory unit consists of 1250 16-bit words, the memory capacity would be rated:

- A.
1250 bits.
- B.**
20,000 bits.
- C.
3260 bits.
- D.
156 bits.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

34. In the sign bit position, a 1 indicates a(n):

- A.**
negative number.
- B.
positive number.
- C.
octal code.
- D.
hexadecimal code.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.03 Negative Numbers
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

35. The 2's complement form of a binary number is the binary number that results when:

- A. all the 1s are changed to 0s.
- B. all the 0s are changed to 1s.
- C. 1 is added to 1s complement.
- D. both all the 1s are changed to 0s and all the 0s are changed to 1s.

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.03 Negative Numbers
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

36. The ASCII code:

- A. is used with absolute encoders.
- B. is considered to be an error-minimizing code.
- C. includes letters as well as numbers.
- D. All of these choices are correct

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.08 ASCII Code
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

37. A(n) _____ bit is used to detect errors that may occur while a word is moved.

- A.** parity
- B. negative
- C. positive
- D. overflow

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.09 Parity Bit
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

38. All number systems use position weighting to represent the significance of an individual digit in a group of numbers.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

39. The base of a number system is the total number of individual symbols in that system.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.01 Decimal System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

40. The binary number system is based on two bytes.

FALSE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

41. The digit of a binary number that has the lowest weight is called the Least Significant Bit.

TRUE

Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Easy
Gradable: automatic
Learning Objective: Know the characteristics of the numbering system codes
Section: 03.02 Binary System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial

42. A negative number in a digital system can be expressed by using the complement of a binary number.

TRUE

*Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes*

Difficulty: Easy

Gradable: automatic

Learning Objective: Know the characteristics of the numbering system codes

Section: 03.03 Negative Numbers

Subtopic: Number System Characteristics

Topic: Number Systems and Codes

Units: Imperial

43. PLCs use the 1's complement method for performing subtraction.

FALSE

Accessibility: Keyboard Navigation

Bloom's: Object 3. Procedural

Bloom's: Verb 3. Apply

Chapter: 03 Number Systems and Codes

Difficulty: Medium

Gradable: automatic

Learning Objective: Add, subtract, multiply, and divide binary numbers

Topic: Number Systems and Codes

Units: Imperial

44. Decimal values entered into a digital machine must be converted into binary form.

TRUE

Accessibility: Keyboard Navigation

Bloom's: Object 1. Factual

Bloom's: Verb 1. Remember

Chapter: 03 Number Systems and Codes

Difficulty: Easy

Gradable: automatic

Learning Objective: Know the characteristics of the numbering system codes

Section: 03.02 Binary System

Subtopic: Number System Characteristics

Topic: Number Systems and Codes

Units: Imperial

45. 1011 is a legitimate BCD number.

FALSE

*Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic*

*Learning Objective: Know the characteristics of the numbering system codes
Section: 03.06 Binary Coded Decimal (BCD) System
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial*

46. Even parity is a method of adding a binary digit to a word to make the total number of 1s in the word even.

TRUE

*Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic*

*Learning Objective: Know the characteristics of the numbering system codes
Section: 03.09 Parity Bit
Subtopic: Number System Characteristics
Topic: Number Systems and Codes
Units: Imperial*

47. Decimal floating-point numbers usually take the form of scientific notation.

TRUE

*Accessibility: Keyboard Navigation
Bloom's: Object 1. Factual
Bloom's: Verb 1. Remember
Chapter: 03 Number Systems and Codes
Difficulty: Medium
Gradable: automatic*

*Learning Objective: Add, subtract, multiply, and divide binary numbers
Section: 03.11 Floating Point Arithmetic
Subtopic: Addition and Subtraction, Multiplication and Division of Binary Numbers
Topic: Number Systems and Codes
Units: Imperial*

48. Double precision of floating point numbers requires 32-bits.

FALSE

Accessibility: Keyboard Navigation

Bloom's: Object 1. Factual

Bloom's: Verb 1. Remember

Chapter: 03 Number Systems and Codes

Difficulty: Medium

Gradable: automatic

Learning Objective: Add, subtract, multiply, and divide binary numbers

Section: 03.11 Floating Point Arithmetic

Subtopic: Addition and Subtraction, Multiplication and Division of Binary Numbers

Topic: Number Systems and Codes

Units: Imperial