

# CS302

## Digital Logic Design

### Important mcqs

#### Lec 1 - An Overview & Number Systems

1. Which number system is commonly used in computing? a. Decimal b. Binary c. Octal d. Hexadecimal  
Answer: b
2. What is the base of the octal number system? a. 2 b. 8 c. 10 d. 16  
Answer: b
3. What is the value of the binary number 1011 in decimal? a. 5 b. 8 c. 10 d. 11  
Answer: d
4. What is the value of the hexadecimal number A2 in decimal? a. 101 b. 162 c. 1620 d. 413  
Answer: b
5. What is the binary equivalent of the decimal number 27? a. 10101 b. 11010 c. 11101 d. 11110  
Answer: c
6. Which number system has the fewest number of symbols? a. Decimal b. Binary c. Octal d. Hexadecimal  
Answer: b
7. What is the value of the octal number 17 in decimal? a. 8 b. 9 c. 15 d. 23  
Answer: b
8. What is the hexadecimal equivalent of the binary number 1101011? a. 6B b. 7A c. 8C d. 9D  
Answer: a
9. What is the value of the decimal number 56 in octal? a. 56 b. 66 c. 70 d. 78  
Answer: c
10. What is the value of the hexadecimal number 3F in binary? a. 111100 b. 111101 c. 111110 d. 111111  
Answer: b

## Lec 2 - Number Systems

1. Which number system uses base 2?

- A) Decimal
- B) Binary
- C) Octal
- D) Hexadecimal

Answer: B

2. How many digits are there in binary system?

- A) 8
- B) 10
- C) 2
- D) 16

Answer: C

3. What is the base of the octal number system?

- A) 2
- B) 8
- C) 10
- D) 16

Answer: B

4. Which number system uses the digits 0-9 and letters A-F?

- A) Decimal
- B) Binary
- C) Octal
- D) Hexadecimal

Answer: D

5. What is the value of the binary number 1101 in decimal form?

- A) 5
- B) 7
- C) 9
- D) 13

Answer: D

6. What is the value of the octal number 73 in decimal form?

- A) 47
- B) 57
- C) 63
- D) 83

Answer: B

7. What is the value of the hexadecimal number AC in decimal form?

- A) 170
- B) 172
- C) 174
- D) 176

Answer: B

8. **Which number system is used to represent colors in HTML?**

- A) Decimal
- B) Binary
- C) Octal
- D) Hexadecimal

**Answer: D**

9. **What is the process of converting a decimal number to a binary number?**

- A) Repeatedly dividing the decimal number by 10
- B) Repeatedly dividing the decimal number by 2
- C) Repeatedly dividing the decimal number by 8
- D) Repeatedly dividing the decimal number by 16

**Answer: B**

10. **What is the process of converting a binary number to a decimal number?**

- A) Multiplying each digit of the binary number by 2 and summing the products
- B) Multiplying each digit of the binary number by 8 and summing the products
- C) Multiplying each digit of the binary number by 10 and summing the products
- D) Multiplying each digit of the binary number by 16 and summing the products

**Answer: A**

## Lec 3 - Floating-Point Numbers

1. Which of the following is a characteristic of floating-point numbers?

- A. They can only represent integers
- B. They have limited precision
- C. They cannot represent negative numbers
- D. They are only used in scientific applications

Answer: B

2. What is the significand of a floating-point number?

- A. The scale of the number
- B. The precision of the number
- C. The number of digits in the number
- D. The exponent of the number

Answer: B

3. Which of the following is an example of a floating-point number?

- A. 10
- B. 3.14159
- C. 1000
- D. 1/3

Answer: B

4. What is the exponent of a floating-point number?

- A. The scale of the number
- B. The precision of the number
- C. The number of digits in the number
- D. The power of 2 used to scale the number

Answer: D

5. Which of the following is true about the precision of floating-point numbers?

- A. It is fixed for all floating-point numbers
- B. It varies depending on the magnitude of the number
- C. It is always greater than the number of bits used to represent the number
- D. It is not relevant to the representation of floating-point numbers

Answer: B

6. What is the largest value that can be represented by a 32-bit floating-point number?

- A.  $10^{38}$
- B.  $10^{308}$
- C.  $3.4028235 \times 10^{38}$
- D.  $1.7976931348623157 \times 10^{308}$

Answer: C

7. What is the smallest value that can be represented by a 64-bit floating-point number?

- A.  $10^{-308}$
- B.  $10^{-38}$
- C.  $1.7976931348623157 \times 10^{-308}$
- D.  $3.4028235 \times 10^{-38}$

Answer: C

8. **Which of the following is a potential issue with using floating-point numbers?**

- A. They cannot represent negative numbers
- B. They have limited precision and can result in rounding errors
- C. They are too complex to use in programming
- D. They are not supported by modern computer hardware

**Answer: B**

9. **What is the IEEE 754 standard?**

- A. A standard for representing binary numbers in decimal form
- B. A standard for representing floating-point numbers in computer systems
- C. A standard for representing integers in floating-point form
- D. A standard for representing rational numbers in binary form

**Answer: B**

10. **Which of the following is an advantage of using floating-point numbers?**

- A. They are easy to represent and manipulate in computer systems
- B. They can represent a wide range of numbers with high precision
- C. They can only be used for scientific applications
- D. They are not affected by rounding errors or precision issues

**Answer: B**

## Lec 4 - NUMBER SYSTEMS & CODES

- Which number system is commonly used in digital electronics?**
  - Decimal
  - Binary
  - Octal
  - Hexadecimal

Answer: b) Binary
- What is the base of the hexadecimal number system?**
  - 2
  - 8
  - 10
  - 16

Answer: d) 16
- What is the decimal equivalent of the binary number 101101?**
  - 41
  - 45
  - 53
  - 59

Answer: d) 59
- Which of the following is a BCD code for the decimal number 3?**
  - 0010
  - 0100
  - 0011
  - 0101

Answer: b) 0100
- What is the excess-3 code for the decimal number 5?**
  - 1000
  - 1010
  - 1100
  - 1110

Answer: d) 1110
- Which of the following is the most compact representation of the number 255 in binary?**
  - 11111111
  - 11111110
  - 11111101
  - 11111100

Answer: a) 11111111
- Which code is used to represent alphanumeric characters in a computer?**
  - ASCII
  - BCD
  - Gray
  - Excess-3

Answer: a) ASCII

8. What is the octal equivalent of the binary number 101010?

- a) 22
- b) 42
- c) 52
- d) 62

Answer: b) 42

9. Which of the following is a Gray code for the binary number 1001?

- a) 1100
- b) 1110
- c) 1111
- d) 1011

Answer: d) 1011

10. What is the decimal equivalent of the octal number 77?

- a) 56
- b) 63
- c) 70
- d) 73

Answer: b) 63

## Lec 5 - LOGIC GATES

1. Which logic gate has only one input and one output?

- A) NOT gate
- B) AND gate
- C) OR gate
- D) XOR gate

Answer: A) NOT gate

2. Which of the following is the symbol for an AND gate?

- A)
- B)
- C)
- D)

Answer: B)

3. Which of the following logic gates is equivalent to an inverted OR gate?

- A) NAND gate
- B) NOR gate
- C) XOR gate
- D) XNOR gate

Answer: B) NOR gate

4. Which of the following logic gates has an output that is high only if both inputs are high?

- A) OR gate
- B) AND gate
- C) NOT gate
- D) XOR gate

Answer: B) AND gate

5. What is the output of an OR gate if both inputs are low?

- A) High
- B) Low
- C) Indeterminate
- D) Cannot be determined

Answer: B) Low

6. Which logic gate has an output that is low only if both inputs are high?

- A) OR gate
- B) AND gate
- C) NOT gate
- D) XOR gate

Answer: A) OR gate

7. Which of the following logic gates has an output that is high only if one of the inputs is high?

- A) OR gate
- B) AND gate
- C) NOT gate
- D) XOR gate



Answer: A) OR gate

8. What is the output of an XOR gate if both inputs are high?

- A) High
- B) Low
- C) Indeterminate
- D) Cannot be determined

Answer: B) Low

9. Which of the following is the symbol for a NAND gate?

- A)
- B)
- C)
- D)

Answer: D)

10. Which of the following is the symbol for an XNOR gate?

- A)
- B)
- C)
- D)

Answer: C)

I hope these help!

## Lec 6 - LOGIC GATES & OPERATIONAL CHARACTERISTICS

1. **What is the basic function of an AND gate?**

- a. Produces a high output if any input is high
- b. Inverts the input signal
- c. Produces a high output if all inputs are high
- d. Produces a low output if all inputs are high

Answer: c. Produces a high output if all inputs are high.

2. **What is the basic function of a NOT gate?**

- a. Produces a high output if all inputs are high
- b. Inverts the input signal
- c. Produces a high output if any input is high
- d. Produces a low output if all inputs are high

Answer: b. Inverts the input signal.

3. **What is the operational characteristic that determines the time it takes for a logic gate's output to respond to a change in its input?**

- a. Propagation delay
- b. Input voltage level
- c. Output voltage level
- d. Logic function

Answer: a. Propagation delay.

4. **What is a logic gate circuit?**

- a. A combination of input and output devices
- b. A combination of logic gates that perform a specific logical operation
- c. An electronic circuit that converts analog signals to digital signals
- d. An electronic circuit that amplifies signals

Answer: b. A combination of logic gates that perform a specific logical operation.

5. **What is the basic function of an OR gate?**

- a. Produces a high output if all inputs are high
- b. Produces a low output if all inputs are high
- c. Produces a high output if any input is high
- d. Inverts the input signal

Answer: c. Produces a high output if any input is high.

6. **Which of the following is not a basic type of logic gate?**

- a. XOR gate
- b. NOT gate
- c. ADD gate
- d. AND gate

Answer: c. ADD gate.

7. **What is the operational characteristic that determines the voltage levels for a logic gate's input and output signals?**
- a. Propagation delay
  - b. Input voltage level
  - c. Output voltage level
  - d. Logic function

**Answer: b. Input voltage level.**

8. **What is a sequential logic circuit?**
- a. A logic gate circuit that performs a specific logical operation
  - b. A circuit that produces an output based on the current state and input signals
  - c. A circuit that has only one input and one output
  - d. A circuit that uses analog signals

**Answer: b. A circuit that produces an output based on the current state and input signals.**

9. **What is the basic function of a NAND gate?**
- a. Produces a low output if all inputs are high
  - b. Inverts the input signal
  - c. Produces a high output if any input is high
  - d. Produces a high output if all inputs are high

**Answer: a. Produces a low output if all inputs are high.**

10. **What is the operational characteristic that determines the voltage levels for a logic gate's output signal?**
- a. Propagation delay
  - b. Input voltage level
  - c. Output voltage level
  - d. Logic function

**Answer: c. Output voltage level.**

## Lec 7 - DIGITAL CIRCUITS AND OPERATIONAL CHARACTERISTICS

1. Which of the following is not a digital circuit component?

- a) Resistor
- b) Capacitor
- c) Transistor
- d) Logic gate

Answer: a) Resistor

2. What is the primary advantage of digital circuits over analog circuits?

- a) Higher accuracy
- b) Lower power consumption
- c) Faster processing
- d) All of the above

Answer: d) All of the above

3. Which of the following is not a basic logic gate?

- a) XOR gate
- b) NAND gate
- c) INHIBIT gate
- d) NOT gate

Answer: c) INHIBIT gate

4. What is the purpose of a decoder circuit?

- a) To convert a binary input into one of several possible outputs
- b) To combine multiple inputs into a single output
- c) To provide a logical complement of the input signal
- d) To amplify the input signal

Answer: a) To convert a binary input into one of several possible outputs

5. What is the propagation delay of a logic gate?

- a) The amount of time it takes for a signal to travel through the gate
- b) The amount of time it takes for the gate output to respond to a change in its input
- c) The amount of time it takes for a gate to power up
- d) The amount of time it takes for a gate to power down

Answer: b) The amount of time it takes for the gate output to respond to a change in its input

6. Which of the following is not an operational characteristic of digital circuits?

- a) Output voltage
- b) Timing characteristics
- c) Frequency response
- d) Power consumption

Answer: c) Frequency response

7. What is the purpose of a multiplexer circuit?

- a) To convert a binary input into one of several possible outputs
- b) To combine multiple inputs into a single output
- c) To provide a logical complement of the input signal
- d) To select one of several input signals to pass through to the output

Answer: d) To select one of several input signals to pass through to the output

8. **Which type of logic uses a high voltage to represent a logical "1"?**

- a) Positive logic
- b) Negative logic
- c) Complementary logic
- d) None of the above

**Answer: a) Positive logic**

9. **What is the primary purpose of simulation in digital circuit design?**

- a) To test the circuit for reliability
- b) To optimize the circuit for power consumption
- c) To analyze the circuit's performance under different input conditions
- d) To manufacture the circuit components

**Answer: c) To analyze the circuit's performance under different input conditions**

10. **Which of the following is not a common application of digital circuits?**

- a) Computer systems
- b) Telecommunications
- c) Power generation
- d) Consumer electronics

**Answer: c) Power generation**

## Lec 8 - BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION

1. Which of the following is NOT a basic logic gate?

- A) AND
- B) OR
- C) NOT
- D) XOR

Solution: D) XOR

2. Which of the following is the identity law for AND operation?

- A)  $A + 0 = A$
- B)  $A + 1 = 1$
- C)  $A \cdot 1 = A$
- D)  $A \cdot 0 = 0$

Solution: C)  $A \cdot 1 = A$

3. Which of the following is the complement of the Boolean expression  $A + B$ ?

- A)  $AB$
- B)  $A + B$
- C)  $A \cdot B$
- D)  $A'B'$

Solution: D)  $A'B'$

4. Which of the following is the DeMorgan's Law for NAND operation?

- A)  $A \cdot B = A + B$
- B)  $A + B = A'B'$
- C)  $A'B' = AB$
- D)  $(A + B)' = A' \cdot B'$

Solution: D)  $(A + B)' = A' \cdot B'$

5. Which of the following is the output of the XOR gate if both inputs are 1?

- A) 0
- B) 1
- C) Cannot be determined
- D) None of the above

Solution: A) 0

6. Which of the following is a Boolean expression for the NOR gate?

- A)  $A + B$
- B)  $A \cdot B$
- C)  $A'B'$
- D)  $(A + B)'$

Solution: D)  $(A + B)'$

7. Which of the following is the associative law for OR operation?

- A)  $A + (B + C) = (A + B) + C$
- B)  $A(B + C) = AB + AC$
- C)  $A + B = B + A$
- D)  $A(B + C) = AB + AC + BC$

Solution: A)  $A + (B + C) = (A + B) + C$

8. Which of the following is the complement of the Boolean expression  $A \cdot B$ ?

A)  $A + B$

B)  $A \cdot B$

C)  $A'B'$

D)  $AB$

Solution: C)  $A'B'$

9. Which of the following is a Boolean expression for the XOR gate?

A)  $A + B$

B)  $A \cdot B$

C)  $A'B' + AB$

D)  $(A + B) \cdot (A'B')$

Solution: C)  $A'B' + AB$

10. Which of the following is a method used for logic simplification?

A) Karnaugh map

B) Quine-McCluskey algorithm

C) Boolean algebra

D) All of the above

Solution: D) All of the above

## Lec 9 - BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION

1. What is the complement of the Boolean expression  $A + B$ ?

- A.  $A + B$
- B.  $AB$
- C.  $A' + B'$
- D.  $AB'$

**Solution: C**

2. What is the output of the AND gate when both inputs are 1?

- A. 0
- B. 1
- C. Undefined
- D. Can't be determined

**Solution: B**

3. Which of the following laws of Boolean algebra is used to simplify the expression  $A(B+C)$ ?

- A. Associative law
- B. Commutative law
- C. Distributive law
- D. DeMorgan's law

**Solution: C**

4. What is the output of the XOR gate when both inputs are 1?

- A. 0
- B. 1
- C. Undefined
- D. Can't be determined

**Solution: A**

5. What is the complement of the Boolean expression  $AB + C$ ?

- A.  $AB' + C'$
- B.  $A' + B' + C'$
- C.  $A + B' + C$
- D.  $AB' + C$

**Solution: B**

6. Which of the following is a simplification technique used for Boolean expressions?

- A. Truth table
- B. Logic gate
- C. Karnaugh map
- D. Flip-flop

**Solution: C**



7. **What is the output of the OR gate when both inputs are 0?**

- A. 0
- B. 1
- C. Undefined
- D. Can't be determined

**Solution: A**

8. **Which of the following is NOT a logical operator in Boolean algebra?**

- A. AND
- B. OR
- C. XOR
- D. NOT

**Solution: C**

9. **Which of the following is a property of DeMorgan's law?**

- A.  $A + 0 = A$
- B.  $A + A' = 0$
- C.  $A(B+C) = AB + AC$
- D.  $(A+B)' = A' \cdot B'$

**Solution: B**

10. **What is the output of the NAND gate when both inputs are 0?**

- A. 0
- B. 1
- C. Undefined
- D. Can't be determined

**Solution: B**

## Lec 10 - KARNAUGH MAP & BOOLEAN EXPRESSION SIMPLIFICATION

### 1. What is a Karnaugh map?

- a) A tool used for digital circuit design
- b) A graphical tool used to simplify Boolean expressions
- c) A method used for logic simplification
- d) A tool used for computer programming

Answer: b) A graphical tool used to simplify Boolean expressions.

### 2. What is the purpose of using a Karnaugh map in Boolean expression simplification?

- a) To identify redundant terms
- b) To group adjacent cells with the same output value
- c) To reduce the complexity of Boolean expressions
- d) All of the above

Answer: d) All of the above.

### 3. How do you represent the complement of a variable in a Karnaugh map?

- a) By writing a bar over the variable
- b) By writing a prime symbol over the variable
- c) By writing a minus sign over the variable
- d) By writing a tilde over the variable

Answer: a) By writing a bar over the variable.

### 4. What is a minterm in Boolean algebra?

- a) A product term that represents the output of a logical expression
- b) A sum term that represents the output of a logical expression
- c) A term that represents a logical operation
- d) A term that represents a binary variable

Answer: a) A product term that represents the output of a logical expression.

### 5. What is a maxterm in Boolean algebra?

- a) A product term that represents the output of a logical expression
- b) A sum term that represents the output of a logical expression
- c) A term that represents a logical operation
- d) A term that represents a binary variable

Answer: b) A sum term that represents the output of a logical expression.

### 6. What is a don't-care condition in a Karnaugh map?

- a) A condition where the output value of a cell does not matter
- b) A condition where the input value of a variable does not matter
- c) A condition where a variable is always true
- d) A condition where a variable is always false

Answer: a) A condition where the output value of a cell does not matter.

7. **What is the purpose of a Karnaugh map in digital circuit design?**

- a) To simplify Boolean expressions
- b) To identify redundant terms
- c) To optimize circuit design
- d) All of the above

Answer: d) All of the above.

8. **What is the output of an AND gate when both inputs are 1?**

- a) 0
- b) 1
- c) Undefined
- d) Depends on the implementation

Answer: b) 1.

9. **What is the output of a NOT gate when the input is 0?**

- a) 0
- b) 1
- c) Undefined
- d) Depends on the implementation

Answer: b) 1.

10. **What is the difference between a sum term and a product term in Boolean algebra?**

- a) A sum term represents the sum of binary variables, while a product term represents their product
- b) A sum term represents their product, while a product term represents their sum
- c) A sum term and a product term are the same thing
- d) None of the above

Answer: a) A sum term represents the sum of binary variables, while a product term represents their product.

## Lec 11 - KARNAUGH MAP & BOOLEAN EXPRESSION SIMPLIFICATION

1. In Karnaugh map, what is the maximum number of cells that can be combined to form a single term?
- 4
  - 8
  - 16
  - 32

Answer: a. 4

2. Which of the following is an advantage of using Karnaugh maps for Boolean expression simplification?
- They are easy to use for large numbers of variables
  - They always result in the most simplified expression
  - They provide a visual representation of the logical function
  - They do not require any knowledge of Boolean algebra

Answer: c. They provide a visual representation of the logical function

3. How many input variables are required for a 4x4 Karnaugh map?
- 2
  - 3
  - 4
  - 5

Answer: b. 3

4. Which Boolean expression is equivalent to the simplified expression  $(A+B)(A+C)$ ?
- $A(B+C)$
  - $AB+AC$
  - $AB+C$
  - $ABC$

Answer: b.  $AB+AC$

5. How many cells are in a 3-variable Karnaugh map?
- 4
  - 8
  - 16
  - 32

Answer: b. 8

6. Which Boolean algebraic operation is used to combine cells in a Karnaugh map?
- AND
  - OR
  - NOT
  - XOR

Answer: b. OR

7. Which of the following is true for a Boolean expression in its simplest form?
- It is always unique
  - It always has the least number of literals
  - It is always in sum-of-products form
  - It always has the smallest possible truth table

Answer: a. It is always unique

8. What is the minimum number of cells required to form a group in a Karnaugh map?
- 1
  - 2
  - 3
  - 4

Answer: b. 2

9. Which of the following is a limitation of Karnaugh maps for Boolean expression simplification?
- They are only applicable for 2-variable expressions
  - They can result in redundant terms in the simplified expression
  - They are computationally intensive for large numbers of variables
  - They are unable to handle expressions with don't cares

Answer: c. They are computationally intensive for large numbers of variables

10. Which Boolean expression is equivalent to the simplified expression  $(A'+B)(A+C)$ ?
- $AB+AC$
  - $A'B+AC$
  - $AB+C$
  - $A'B+C$

Answer: d.  $A'B+C$

## Lec 12 - COMPARATOR

1. Which of the following is a primary application of a comparator?

- a. Digital signal processing
- b. Analog signal processing
- c. Audio signal amplification
- d. None of the above

Answer: a

2. Which of the following is not a type of comparator?

- a. Voltage comparator
- b. Current comparator
- c. Phase comparator
- d. Time comparator

Answer: c

3. Which of the following is true about an ideal comparator?

- a. It has infinite gain
- b. It has zero offset voltage
- c. It has infinite bandwidth
- d. All of the above

Answer: d

4. Which of the following is a common type of output for a comparator?

- a. Pulse width modulated signal
- b. Analog signal
- c. Digital signal
- d. Sine wave

Answer: c

5. Which of the following is not a factor to consider when selecting a comparator?

- a. Power consumption
- b. Supply voltage
- c. Input offset voltage
- d. Operating temperature

Answer: d

6. What is the function of a hysteresis circuit in a comparator?

- a. To reduce noise
- b. To provide a fixed reference voltage
- c. To increase the gain
- d. To amplify the output signal

Answer: a

7. **Which of the following is not a common comparator input configuration?**
- a. Inverting
  - b. Non-inverting
  - c. Differential
  - d. Single-ended

**Answer: d**

8. **What is the output state of a comparator if the input voltages are equal?**
- a. High
  - b. Low
  - c. Depends on the type of comparator
  - d. Indeterminate

**Answer: d**

9. **Which of the following is not a type of comparator output stage?**
- a. Open-drain
  - b. Push-pull
  - c. Source-follower
  - d. None of the above

**Answer: d**

10. **Which of the following is a benefit of using a comparator in a control system?**
- a. High precision and accuracy
  - b. Low power consumption
  - c. High gain
  - d. All of the above

**Answer: a**

## Lec 13 - ODD-PRIME NUMBER DETECTOR

- Which Boolean logic gate is typically used to detect odd numbers?**
  - A) AND
  - B) OR
  - C) NOT
  - D) XOR

Answer: D (XOR)
- Which of the following is a prime number?**
  - A) 4
  - B) 5
  - C) 6
  - D) 8

Answer: B (5)
- What is the output of an odd-prime number detector if the input is 2?**
  - A) High
  - B) Low
  - C) Undefined
  - D) Depends on the circuit design

Answer: B (Low)
- What is the output of an odd-prime number detector if the input is 3?**
  - A) High
  - B) Low
  - C) Undefined
  - D) Depends on the circuit design

Answer: A (High)
- Which of the following is a composite number?**
  - A) 2
  - B) 3
  - C) 5
  - D) 8

Answer: D (8)
- Which of the following is a valid Boolean expression for detecting odd prime numbers?**
  - A) A AND B
  - B) A OR B
  - C) NOT A OR B
  - D) A XOR B

Answer: D (A XOR B)
- Which of the following is a valid Boolean expression for detecting odd numbers?**
  - A) A AND B
  - B) A OR B
  - C) NOT A OR B
  - D) A XOR B

Answer: D (A XOR B)



8. Which of the following is a valid Boolean expression for detecting prime numbers?

- A) A AND B
- B) A OR B
- C) NOT A OR B
- D) A XOR B

Answer: C (NOT A OR B)

9. How many inputs are required for an odd-prime number detector?

- A) 1
- B) 2
- C) 3
- D) 4

Answer: 1 (one input)

10. How can the number of gates in an odd-prime number detector be reduced?

- A) By increasing the number of inputs
- B) By using more complex gates
- C) By using simpler gates
- D) By increasing the number of outputs

Answer: C (By using simpler gates)

## Lec 14 - IMPLEMENTATION OF AN ODD-PARITY GENERATOR CIRCUIT

- Which logic gate is typically used in the implementation of an odd-parity generator circuit?**
  - NOT gate
  - XOR gate
  - OR gate
  - AND gate**Answer: b**
- What is the purpose of an odd-parity generator circuit?**
  - To generate random numbers
  - To generate a parity bit based on the input data
  - To add noise to the data signal
  - To compress the data signal**Answer: b**
- In an odd-parity generator circuit, the parity bit is set to 1 if:**
  - The number of 0's in the data input is even
  - The number of 0's in the data input is odd
  - The number of 1's in the data input is even
  - The number of 1's in the data input is odd**Answer: c**
- How many input bits are required for an odd-parity generator circuit to generate a single parity bit?**
  - 1
  - 2
  - 3
  - 4**Answer: 1**
- Which of the following represents the output of an odd-parity generator circuit for the input 10101?**
  - 101010
  - 101011
  - 101000
  - 101001**Answer: b**
- In an odd-parity generator circuit, what is the output when the input has an odd number of 1's?**
  - 0
  - 1
  - Depends on the specific circuit implementation
  - Cannot be determined**Answer: b**
- Which of the following is a disadvantage of using an odd-parity generator circuit?**
  - It requires additional hardware to implement
  - It can only detect single-bit errors
  - It slows down the data transmission speed

d) It increases the complexity of the system

**Answer: a**

8. **Which logic gate can be used to implement an odd-parity checker circuit?**

a) OR gate

b) XOR gate

c) AND gate

d) NAND gate

**Answer: b**

9. **Which of the following is a valid input for an odd-parity generator circuit?**

a) 01010

b) 11000

c) 11111

d) 00000

**Answer: b**

10. **What is the function of a parity bit in digital communication systems?**

a) To add noise to the data signal

b) To compress the data signal

c) To verify the accuracy of the transmitted data

d) To increase the complexity of the system

**Answer: c**

## Lec 15 - BCD ADDER

1. **What is the purpose of a BCD adder circuit?**

- A) To add two binary numbers
- B) To add two decimal numbers
- C) To add two BCD numbers
- D) To subtract two BCD numbers

**Answer: C**

2. **Which type of logic gates are used in BCD adder circuit?**

- A) AND gates
- B) OR gates
- C) XOR gates
- D) All of the above

**Answer: D**

3. **How many bits are required to represent a single BCD digit?**

- A) 2
- B) 3
- C) 4
- D) 5

**Answer: C**

4. **How many full adders are required to design a 4-bit BCD adder?**

- A) 1
- B) 2
- C) 3
- D) 4

**Answer: 2**

5. **Which input(s) of a BCD adder are applied to the carry-in of the first full adder?**

- A) The least significant bit (LSB) of both inputs
- B) The most significant bit (MSB) of both inputs
- C) The carry-out of the previous stage and the LSB of the current stage input
- D) None of the above

**Answer: D**

6. **What is the maximum sum that can be generated by a single BCD adder?**

- A) 9
- B) 10
- C) 15
- D) 16

**Answer: 9**

7. **What is the carry-out of a full adder when both inputs are 1?**

- A) 0
- B) 1
- C) 2
- D) Cannot be determined

**Answer: 1**

8. **Which type of multiplexer is used in BCD adder to select between the carry-in and sum output of the full adder?**

- A) 2:1
- B) 4:1
- C) 8:1
- D) 16:1

**Answer: A**

9. **What is the purpose of the parity generator in BCD adder circuit?**

- A) To check for errors in the input data
- B) To ensure that the output is a valid BCD number
- C) To generate a parity bit for error detection
- D) None of the above

**Answer: B**

10. **What is the maximum number of BCD digits that can be added using an 8-bit BCD adder?**

- A) 1
- B) 2
- C) 4
- D) 8

**Answer: 2**

## Lec 16 - 16-BIT ALU

1. **What is the full form of ALU?**

- A) Arithmetic Logic Unit
- B) Advance Logic Unit
- C) Algorithmic Logic Unit
- D) Auxiliary Logic Unit

**Solution: A) Arithmetic Logic Unit**

2. **What is the function of ALU?**

- A) To store data
- B) To transfer data
- C) To perform arithmetic and logic operations
- D) To display data

**Solution: C) To perform arithmetic and logic operations**

3. **Which sub-circuit of 16-BIT ALU performs addition and subtraction?**

- A) Logical operators
- B) Carry-lookahead unit
- C) Adders and subtractors
- D) Multiplexers

**Solution: C) Adders and subtractors**

4. **What is the maximum size of numbers that can be processed by a 16-bit ALU?**

- A) 16 bits
- B) 32 bits
- C) 64 bits
- D) 128 bits

**Solution: A) 16 bits**

5. **Which bitwise operation can be performed by the 16-bit ALU?**

- A) AND
- B) OR
- C) XOR
- D) All of the above

**Solution: D) All of the above**

6. **Which of the following is not a component of the 16-bit ALU?**

- A) Adders
- B) Logical operators
- C) Multiplexers
- D) Flip-flops

**Solution: D) Flip-flops**

7. **Which microprocessor uses a 16-bit ALU?**

- A) Intel 8086
- B) Intel 80386
- C) Intel 80486
- D) Intel Pentium

**Solution: A) Intel 8086**

8. **Which sub-circuit of 16-bit ALU generates the carry out signal?**

- A) Adders
- B) Logical operators
- C) Multiplexers
- D) Carry-lookahead unit

**Solution: D) Carry-lookahead unit**

9. **Which arithmetic operation can be performed by the 16-bit ALU?**

- A) Addition
- B) Subtraction
- C) Multiplication
- D) Division

**Solution: A) Addition**

10. **Which logical operation can be performed by the 16-bit ALU?**

- A) NOT
- B) AND
- C) OR
- D) NAND

**Solution: B) AND**

## Lec 17 - THE 74XX138 3-TO-8 DECODER

1. **What is the function of the 74xx138 decoder?**

- A) Converts 8-bit code to 3-bit output
- B) Converts 3-bit code to 8-bit output
- C) Converts 2-bit code to 4-bit output
- D) Converts 4-bit code to 2-bit output

**Answer: B) Converts 3-bit code to 8-bit output**

2. **How many inputs does the 74xx138 decoder have?**

- A) 1
- B) 2
- C) 3
- D) 4

**Answer: C) 3**

3. **How many outputs does the 74xx138 decoder have?**

- A) 4
- B) 6
- C) 8
- D) 10

**Answer: C) 8**

4. **What is the maximum number of inputs that can be decoded by the 74xx138 decoder?**

- A) 4
- B) 6
- C) 8
- D) 10

**Answer: C) 8**

5. **What is the active output for the input code 001 in the 74xx138 decoder?**

- A) Y0
- B) Y1
- C) Y2
- D) Y3

**Answer: D) Y3**

6. **What is the active output for the input code 111 in the 74xx138 decoder?**

- A) Y0
- B) Y1
- C) Y6
- D) Y7

**Answer: D) Y7**



7. **What is the function of the enable input in the 74xx138 decoder?**

- A) To enable the decoder to function
- B) To disable the decoder
- C) To select the input code
- D) To select the output

**Answer: B) To disable the decoder**

8. **What is the function of the active-low output in the 74xx138 decoder?**

- A) Inverts the output signal
- B) Disables the output signal
- C) Enables the output signal
- D) None of the above

**Answer: A) Inverts the output signal**

9. **What is the maximum number of output lines that can be enabled in the 74xx138 decoder?**

- A) 1
- B) 2
- C) 3
- D) 8

**Answer: C) 3**

10. **What is the function of the address decoder in a digital circuit?**

- A) Converts binary codes to analog signals
- B) Converts analog signals to digital codes
- C) Decodes memory addresses to select a specific memory location
- D) None of the above

**Answer: C) Decodes memory addresses to select a specific memory location**

## Lec 18 - 2-INPUT 4-BIT MULTIPLEXER

1. How many data inputs does a 2-input 4-bit multiplexer have?

- a) 2
- b) 4
- c) 8
- d) 16

Answer: b) 4

2. How many control inputs does a 2-input 4-bit multiplexer have?

- a) 2
- b) 4
- c) 8
- d) 16

Answer: a) 2

3. What is the maximum number of inputs that a 2-input 4-bit multiplexer can select from? a) 2 b) 4 c) 8 d) 16 Answer: b) 4

4. In a 2-input 4-bit multiplexer, how many bits are used to represent the selection inputs? a) 1 b) 2 c) 4 d) 8 Answer: b) 2

5. What is the output of a 2-input 4-bit multiplexer if the selection inputs are 00 and the data inputs are 0110, 1011, 1100, and 1111? a) 0110 b) 1011 c) 1100 d) 1111 Answer: a) 0110

6. What is the output of a 2-input 4-bit multiplexer if the selection inputs are 10 and the data inputs are 0110, 1011, 1100, and 1111? a) 0110 b) 1011 c) 1100 d) 1111 Answer: d) 1111

7. What is the truth table for a 2-input 4-bit multiplexer? a) 16 rows b) 8 rows c) 4 rows d) 2 rows Answer: c) 4 rows

8. What is the main function of a 2-input 4-bit multiplexer? a) To convert binary signals into analog signals b) To store data c) To select one input from multiple inputs based on the control inputs d) To perform arithmetic operations Answer: c) To select one input from multiple inputs based on the control inputs

9. What is the advantage of using a 2-input 4-bit multiplexer in digital circuits? a) It reduces circuit complexity b) It increases circuit complexity c) It increases the number of wires needed to connect multiple inputs to a single output d) It increases the number of output signals Answer: a) It reduces circuit complexity

10. Which of the following is NOT a typical application for a 2-input 4-bit multiplexer? a) Data compression b) Signal routing c) Address decoding d) Arithmetic operations Answer: d) Arithmetic operations

## Lec 19 - DEMULTIPLEXER

1. **What is the purpose of a demultiplexer?**
2. a) To route one input to several outputs b) To route several inputs to one output c) To combine multiple signals into one output d) None of the above

**Solution: a**

2. **How many control lines are required for a 4-to-1 demultiplexer?** a) 1 b) 2 c) 3 d) 4

**Solution: b**

3. **Which logic gate is commonly used to implement a demultiplexer?** a) AND gate b) OR gate c) NOT gate d) XOR gate

**Solution: a**

4. **What is the output of a demultiplexer when all control lines are low?** a) All outputs are low b) All outputs are high c) One output is high and the rest are low d) None of the above

**Solution: a**

5. **Which demultiplexer is commonly used for decoding address lines in memory devices?** a) 1-to-2 demultiplexer b) 2-to-4 demultiplexer c) 3-to-8 demultiplexer d) 4-to-16 demultiplexer

**Solution: c**

6. **Which demultiplexer is equivalent to two 2-to-1 demultiplexers?** a) 1-to-2 demultiplexer b) 2-to-4 demultiplexer c) 3-to-8 demultiplexer d) 4-to-16 demultiplexer

**Solution: b**

7. **What is the function of the enable input in a demultiplexer?** a) To select which output to route the input to b) To enable or disable the demultiplexer c) To control the polarity of the output signals d) None of the above

**Solution: b**

8. **Which demultiplexer is commonly used for separating the color signals in a video signal?** a) 1-to-2 demultiplexer b) 2-to-4 demultiplexer c) 3-to-8 demultiplexer d) 4-to-16 demultiplexer

**Solution: a**

9. **What is the difference between a demultiplexer and a decoder?** a) A decoder has multiple inputs and one output, while a demultiplexer has one input and multiple outputs b) A decoder is used for data compression, while a demultiplexer is used for data expansion c) A decoder outputs binary codes, while a demultiplexer outputs analog signals d) There is no difference between a demultiplexer and a decoder

**Solution: a**

10. **Which demultiplexer is commonly used for splitting a serial data stream into parallel data streams?** a) 1-to-2 demultiplexer b) 2-to-4 demultiplexer c) 3-to-8 demultiplexer d) 4-to-16 demultiplexer

**Solution: a**

## Lec 20 - IMPLEMENTING CONSTANT 0S AND 1S

1. Which technique is used to implement a constant 0 signal in digital circuits? a. Pull-up resistor  
b. Pull-down resistor  
c. Logic gate output connection  
d. Both a and b

Answer: b. Pull-down resistor

2. Which technique is used to implement a constant 1 signal in digital circuits? a. Pull-up resistor b. Pull-down resistor c. Logic gate output connection d. Both a and b

Answer: a. Pull-up resistor

3. Which logic gate is commonly used to implement a pull-up resistor? a. AND gate b. OR gate c. NOT gate d. XOR gate

Answer: c. NOT gate

4. Which logic gate is commonly used to implement a pull-down resistor? a. AND gate b. OR gate c. NOT gate d. XOR gate

Answer: b. OR gate

5. What is the purpose of using a pull-up or pull-down resistor? a. To ensure a constant input signal b. To prevent signal fluctuations c. To increase the signal amplitude d. To decrease the signal amplitude

Answer: a. To ensure a constant input signal

6. What is the value of a pull-up resistor? a. Infinite resistance b. Zero resistance c. High resistance d. Low resistance

Answer: c. High resistance

7. What is the value of a pull-down resistor? a. Infinite resistance b. Zero resistance c. High resistance d. Low resistance

Answer: d. Low resistance

8. Which type of resistor is commonly used for pull-up or pull-down resistors? a. Carbon resistor b. Variable resistor c. Film resistor d. Semiconductor resistor

Answer: a. Carbon resistor

9. In which type of digital circuit is the implementation of constant signals crucial? a. Memory circuits b. Microprocessors c. Communication circuits d. Power circuits

Answer: b. Microprocessors

10. Which of the following is not a technique for implementing a constant signal? a. Pull-up resistor b. Pull-down resistor c. Logic gate output connection d. Variable resistor adjustment

Answer: d. Variable resistor adjustment

## Lec 21 - THE GAL16V8

1. **What is the GAL16V8?** A) A type of microcontroller B) A type of programmable logic device C) A type of analog circuit D) A type of memory chip **Answer: B**
2. **What does GAL stand for in GAL16V8?** A) Gate Array Logic B) Generic Array Logic C) Generalized Array Logic D) Graphics Array Logic **Answer: B**
3. **Which of the following is true about GAL16V8?** A) It contains a programmable AND array and a fixed OR array B) It contains a programmable OR array and a fixed AND array C) It contains both a programmable AND array and a programmable OR array D) It contains a fixed AND array and a fixed OR array **Answer: C**
4. **How is the GAL16V8 programmed?** A) Using a software tool B) Using a hardware programmer C) Both A and B D) None of the above **Answer: C**
5. **Which of the following applications has the GAL16V8 been widely used in?** A) Digital cameras B) Microwave ovens C) Control systems D) Home appliances **Answer: C**
6. **What type of logic circuits can GAL16V8 implement?** A) Only combinatorial logic circuits B) Only sequential logic circuits C) Both combinatorial and sequential logic circuits D) None of the above **Answer: C**
7. **Which of the following is a feature of GAL16V8?** A) It can only implement simple logic circuits B) It can be reprogrammed multiple times C) It is very expensive compared to other PLDs D) It can only be programmed using a hardware programmer **Answer: B**
8. **What is the maximum number of inputs and outputs in GAL16V8?** A) 16 inputs and 8 outputs B) 8 inputs and 16 outputs C) 16 inputs and 16 outputs D) 8 inputs and 8 outputs **Answer: C**
9. **What is the maximum number of product terms that can be programmed in GAL16V8?** A) 8 B) 16 C) 32 D) 64 **Answer: D**
10. **Which of the following is not true about GAL16V8?** A) It can implement simple state machines B) It has a low power consumption C) It is not suitable for high-speed applications D) It can be used as a replacement for discrete logic gates **Answer: C**

## Lec 22 - ABEL INPUT FILE OF A QUAD 1-OF-4 MUX

### 1. What does ABEL stand for in relation to digital circuit design?

1. 

A) Advanced Boolean Expression Language B) Analog Binary Electronics Language C) Advanced Binary Electronics Language D) Analog Boolean Expression Language **Answer: A**
2. **What is an ABEL input file used for in digital circuit design?**

A) To program the GAL16V8 device B) To create a physical circuit board C) To analyze the behavior of a circuit D) To create a software simulation of a circuit **Answer: A**
3. **What is the purpose of a quad 1-of-4 MUX?**

A) To select one of four inputs to pass through to the output B) To perform arithmetic operations on multiple inputs C) To generate a clock signal for a digital circuit D) To store data in a register **Answer: A**
4. **What does MUX stand for in digital circuit design?**

A) Multiple Unit X-ray B) Multiplexer C) Multi-dimensional X-coordinate D) Multi User X-server **Answer: B**
5. **What are the input pins of a quad 1-of-4 MUX?**

A) A, B, C, D B) S0, S1, S2, S3 C) EN, D0, D1, D2, D3 D) CLK, D, Q **Answer: A**
6. **What are the selection lines of a quad 1-of-4 MUX?**

A) S0, S1 B) EN, D C) A, B, C, D D) CLK, Q **Answer: A**
7. **How many output pins does a quad 1-of-4 MUX have?**

A) 1 B) 2 C) 4 D) 8 **Answer: 1**
8. **What is the purpose of the logical equations in an ABEL input file for a quad 1-of-4 MUX?**

A) To determine the output based on the selection lines B) To program the GAL16V8 device C) To create a software simulation of the MUX D) To analyze the behavior of the MUX **Answer: A**
9. **Which type of language is ABEL?**

A) High-level programming language B) Low-level programming language C) Hardware description language D) Assembly language **Answer: C**
10. **What is the GAL16V8 device used for in digital circuit design?**

A) Implementing custom logic functions B) Generating clock signals C) Storing data in registers D) Performing arithmetic operations on multiple inputs **Answer: A**



