Chapter 3: Digital Systems and Logic Design

MCQs from the Chapter "Digital Systems and Logic Design":

EXERCISE MCQs with Answers

1. Which of the following Boolean expressions represents the OR operation?

(a) AB (b) A + B ✓

(c) A (d) AB

2. What is the dual of the Boolean expression A . 0 = 0?

(a) A + 1 = 1 ✓ (b) A + 0 = A

(c) 1 = A (d) A * 0 = 0

3. Which logic gate outputs true only if both inputs are true?

(a) OR gate (b) AND gate ✓

(c) XOR gate (d) NOT gate

4. In a half-adder circuit, the carry is generated by which operation?

(a) XOR operation (b) AND operation ✓

(c) OR operation (d) NOT operation

5. What is the decimal equivalent of the binary number 1101?

(a) 11 (b) 12

(c) 13 ✓ (d) 14

Final Answer Key:
1 → (b) - 2 → (a) - 3 → (b) - 4 → (b) - 5 → (c)

Additional MCQs with Answers

Topic 1: Analog vs Digital Systems

1. Which of the following is an example of an analog system?
   (a) Digital clock (b) Thermometer with mercury ✓
   (c) Calculator (d) Computer
2. Digital systems use which type of signals?
   (a) Continuous (b) Discrete ✓
   (c) Smooth (d) Random
3. Which of the following is NOT an advantage of digital systems?
   (a) Noise resistance (b) High speed
   (c) Infinite precision ✓ (d) Easy storage
4. Which system is better for processing audio signals directly?
   (a) Digital system (b) Analog system ✓
   (c) Hybrid system (d) None of these
5. Which of the following devices converts analog signals into digital form?
   (a) Amplifier (b) Digital clock
   (c) ADC (Analog to Digital Converter) ✓ (d) Oscillator

Topic 2: Logic Gates (AND, OR, NOT, etc.)

1. The NOT gate is also known as:
   (a) Inverter ✓ (b) Buffer
   (c) Amplifier (d) Subtractor
2. The symbol "." in Boolean algebra represents:
   (a) OR (b) AND ✓
   (c) NOT (d) XOR
3. The output of an OR gate is 1 when:
   (a) Both inputs are 0 (b) At least one input is 1 ✓
   (c) Both inputs are 1 only (d) Inputs are inverted
4. Which gate gives output 1 only if inputs are different?
   (a) AND (b) OR
   (c) XOR ✓ (d) NOR
5. Which of the following is the universal gate?
   (a) AND (b) OR
   (c) NAND ✓ (d) XOR

Topic 3: Truth Tables & Boolean Expressions

1. The truth table of an AND gate shows output 1 only when:
   (a) One input is 1 (b) Both inputs are 1 ✓
   (c) Both inputs are 0 (d) Inputs are different
2. The Boolean expression A + A is equal to:
   (a) A ✓ (b) A^2
   (c) 2A (d) 0
3. What is the result of A . 1?
   (a) 0 (b) 1
   (c) A ✓ (d) A + 1
4. The Boolean expression for a NOT gate is:
   (a) A + B (b) AB
   (c) A′ ✓ (d) A – B
5. In Boolean algebra, the complement of 0 is:
   (a) 0 (b) 1 ✓
   (c) A (d) A′

Topic 4: Logic Circuits & Half/Full Adder

1. A half-adder has:
   (a) 1 input and 1 output (b) 2 inputs and 2 outputs ✓
   (c) 2 inputs and 1 output (d) 3 inputs and 2 outputs
2. The sum output of a half-adder is produced by which gate?
   (a) AND (b) OR
   (c) XOR ✓ (d) NOT
3. A full-adder has how many inputs?
   (a) 2 (b) 3 ✓
   (c) 4 (d) 1
4. A full-adder circuit can be made by combining:
   (a) Two AND gates (b) Two half-adders and an OR gate ✓
   (c) Two XOR gates only (d) One NAND and one NOR gate
5. Which component is most important in building arithmetic circuits in computers?
   (a) Multiplexer (b) Adder ✓
   (c) Decoder (d) Encoder

Topic 5: Applications of Digital Systems

1. Which of the following is a digital device?
   (a) Analog thermometer (b) Digital camera ✓
   (c) Speedometer (needle type) (d) Mercury thermometer
2. Digital logic is used in:
   (a) Traffic lights ✓ (b) Sundial
   (c) Manual clock (d) Candle light
3. Which of the following uses digital signals?
   (a) Computer ✓ (b) Analog radio
   (c) Gramophone (d) Old telephone
4. In washing machines, digital logic is used for:
   (a) Display only (b) Automatic control ✓
   (c) Heating only (d) None of these
5. Which field depends most heavily on digital systems?
   (a) Agriculture (b) Medicine ✓
   (c) Handicrafts (d) Painting