Chapter 2 MCQs

Section 2.1: Digital Logic - Number Systems, Logic Levels, Logic Gates, Boolean Algebra

Key Topics Covered

- Number Systems: Binary, Decimal, Octal, Hexadecimal.
- Logic Gates: AND, OR, NOT, XOR, NAND, NOR.
- Boolean Algebra: Simplification using laws.
- SOP (Sum-of-Products) and POS (Product-of-Sums).
- Karnaugh Maps.

MCQs for Section 2.1

1. **Q1**: How many binary digits (bits) are needed to represent the decimal number 25?
   A) 3
   B) 5
   C) 6
   D) 8
   Answer: B) 5

2. **Q2**: The decimal equivalent of the binary number 10101 is:
   A) 21
   B) 22
   C) 23
   D) 25
   Answer: D) 25

3. **Q3**: How many outputs does a 3-input AND gate have?
   A) 1
   B) 2
   C) 3
   D) 8
   Answer: A) 1

4. **Q4**: Which of the following logic gates has the output HIGH when all inputs are LOW?
   A) AND
   B) OR
   C) NAND
   D) NOR
   Answer: D) NOR

5. **Q5**: The Boolean expression for a 2-input AND gate is:
   A) A + B
   B) A . B
   C) A ⊕ B

D) A + B'
Answer: B) A . B

6. **Q6**: What is the binary equivalent of the hexadecimal number A7?
   A) 10100111
   B) 11010011
   C) 11100101
   D) 10101111
   Answer: A) 10100111

7. **Q7**: In Boolean algebra, the complement of a variable A is represented as:
   A) A'
   B) ~A
   C) Ā
   D) A^{-}
   Answer: A) A'

8. **Q8**: The truth table of an XOR gate shows a HIGH output when:
   A) Both inputs are LOW
   B) Both inputs are HIGH
   C) The inputs are different
   D) Both inputs are the same
   Answer: C) The inputs are different

9. **Q9**: A Karnaugh map with 3 variables has how many cells?
   A) 4
   B) 6
   C) 8
   D) 16
   Answer: C) 8

10. **Q10**: The simplified Boolean expression for (A + A'B) is:
    A) A
    B) B
    C) A + B
    D) A'
    Answer: C) A + B

11. **Q11**: What is the decimal equivalent of the octal number 57?
    A) 39
    B) 47
    C) 55
    D) 63
    Answer: D) 63

12. **Q12**: Which of the following expressions represents the SOP (Sum of Products) form?
    A) (A + B) (C + D)
    B) A.B + C.D
    C) A' + BC

D) AB + A'C
Answer: D) AB + A'C

13. **Q13**: The hexadecimal number F corresponds to which binary value?
    A) 1110
    B) 1111
    C) 111
    D) 11100
    Answer: B) 1111

14. **Q14**: In Boolean algebra, the law A + AB = A is known as:
    A) Associative law
    B) Distributive law
    C) Absorption law
    D) Demorgan's law
    Answer: C) Absorption law

15. **Q15**: A Boolean equation that equals 0 for all combinations of variables is called:
    A) Tautology
    B) Contradiction
    C) Idempotent
    D) Absorption
    Answer: B) Contradiction

16. **Q16**: The gate that produces a HIGH output only when all inputs are HIGH is:
    A) OR
    B) XOR
    C) AND
    D) NAND
    Answer: C) AND

17. **Q17**: The hexadecimal equivalent of the binary number 101110 is:
    A) 2E
    B) 2D
    C) 3A
    D) 5B
    Answer: A) 2E

18. **Q18**: Which Boolean algebra property is illustrated by the equation A . (A + B) = A?
    A) Commutative
    B) Associative
    C) Distributive
    D) Absorption
    Answer: D) Absorption

19. **Q19**: The product term in the sum-of-products (SOP) expression is formed by:
    A) ORing the variables
    B) ANDing the variables
    C) XORing the variables

D) NORing the variables
Answer: B) ANDing the variables

20. **Q20**: How many inputs and outputs are there in a basic NOT gate?
    A) 1 input, 1 output
    B) 2 inputs, 1 output
    C) 3 inputs, 1 output
    D) 2 inputs, 2 outputs
    Answer: A) 1 input, 1 output

21. **Q21**: The binary representation of the decimal number 9 is:
    A) 1001
    B) 1010
    C) 1100
    D) 1110
    Answer: A) 1001

22. **Q22**: The number of rows in the truth table of a 4-input logic gate is:
    A) 8
    B) 16
    C) 32
    D) 64
    Answer: B) 16

23. **Q23**: Boolean algebra is mainly used to simplify:
    A) Logical expressions
    B) Number systems
    C) Flip-Flops
    D) Karnaugh maps
    Answer: A) Logical expressions

24. **Q24**: Which logic gate is represented by the Boolean equation Y = A'B?
    A) AND
    B) OR
    C) NAND
    D) NOR
    Answer: D) NOR

25. **Q25**: What is the result of the binary addition 1011 + 1101?
    A) 10100
    B) 11000
    C) 11010
    D) 10110
    Answer: A) 10100

26. **Q26**: How many bits are in a byte?
    A) 4
    B) 8
    C) 16

D) 32
Answer: B) 8

27. **Q27**: What does the logic gate AND do?
    A) Returns a HIGH output when one input is HIGH
    B) Returns a HIGH output only when both inputs are HIGH
    C) Returns a LOW output when one input is LOW
    D) Returns a LOW output when both inputs are HIGH
    Answer: B) Returns a HIGH output only when both inputs are HIGH

28. **Q28**: The binary value of the octal number 57 is:
    A) 101110
    B) 110111
    C) 101011
    D) 111010
    Answer: A) 101110

29. **Q29**: Which of the following is the Boolean equation for an OR gate?
    A) Y = A . B
    B) Y = A + B
    C) Y = A'B
    D) Y = AB'
    Answer: B) Y = A + B

30. **Q30**: What is the decimal equivalent of the hexadecimal number B4?
    A) 180
    B) 189
    C) 184
    D) 192
    Answer: C) 184

31. **Q31**: Which of the following uses binary numbers to represent negative numbers?
    A) Sign-and-magnitude
    B) 1’s complement
    C) 2’s complement
    D) Both B and C
    Answer: D) Both B and C

32. **Q32**: What is the 2’s complement of

binary 1101?
A) 0011
B) 0110
C) 1011
D) 0101
Answer: D) 0101

33. **Q33**: The octal number 345 can be written in decimal as:
    A) 229

B) 239
C) 225
D) 231
Answer: A) 229

34. **Q34**: A logic gate that outputs 1 when at least one input is 1 is the:
A) AND gate
B) OR gate
C) XOR gate
D) NOR gate
Answer: B) OR gate

35. **Q35**: The binary number 11010 can be written as what decimal value?
A) 26
B) 28
C) 30
D) 22
Answer: D) 26

36. **Q36**: If a logic gate has inputs A and B, the Boolean expression for an XOR gate is:
A) A ⊕ B
B) A + B
C) AB'
D) A'B
Answer: A) A ⊕ B

37. **Q37**: How many variables are used in a 4x4 Karnaugh Map?
A) 2
B) 3
C) 4
D) 5
Answer: C) 4

38. **Q38**: The logic gate that performs the operation A' + B' is:
A) AND
B) OR
C) NOR
D) NAND
Answer: C) NOR

39. **Q39**: Which of the following is true about De Morgan's theorem?
A) (A.B)' = A' + B'
B) (A + B)' = A'B'
C) (A.B)' = A + B
D) None of the above
Answer: A) (A.B)' = A' + B'

40.**Q40**: The decimal value of the binary number 1101 is:
A) 11

B) 12
C) 13
D) 14
Answer: C) 13

Section 2.2: Combinational and Arithmetic Circuits (40 MCQs)

Key Topics

- Multiplexers, Demultiplexers, Encoders, Decoders.
- Binary Addition and Subtraction.
- Operations on Unsigned and Signed Binary Numbers.

MCQs

1. **Q1**: A multiplexer is a device that:
   A) Adds two binary numbers
   B) Combines multiple inputs into a single output
   C) Encodes binary data
   D) Decodes binary data
   Answer: B) Combines multiple inputs into a single output

2. **Q2**: Which device is used to select one of many input signals and forwards it to a single output?
   A) Decoder
   B) Multiplexer
   C) Encoder
   D) Demultiplexer
   Answer: B) Multiplexer

3. **Q3**: A 4-to-1 multiplexer has how many select lines?
   A) 1
   B) 2
   C) 3
   D) 4
   Answer: B) 2

4. **Q4**: A demultiplexer is used to:
   A) Combine multiple inputs into one
   B) Distribute a single input to multiple outputs
   C) Encode data
   D) Perform binary addition
   Answer: B) Distribute a single input to multiple outputs

5. **Q5**: The sum of 1101 (13 in decimal) and 1010 (10 in decimal) in binary is:
   A) 11000
   B) 11111
   C) 10001

D) 10101
Answer: A) 11000

6. **Q6**: What is the difference when 1011 (11) is subtracted from 1111 (15) in binary?
   A) 0100
   B) 1001
   C) 0010
   D) 0110
   Answer: A) 0100

7. **Q7**: How many inputs can a 16-to-1 multiplexer handle?
   A) 4
   B) 8
   C) 16
   D) 32
   Answer: C) 16

8. **Q8**: In a 3-to-8 decoder, how many output lines will be active for a given input?
   A) 1
   B) 2
   C) 3
   D) 8
   Answer: A) 1

9. **Q9**: A 4-bit adder can add two binary numbers of:
   A) 3 bits each
   B) 4 bits each
   C) 8 bits each
   D) 16 bits each
   Answer: B) 4 bits each

10. **Q10**: What is the function of an encoder in digital circuits?
    A) It performs binary addition
    B) It decodes binary data
    C) It converts data into binary form
    D) It selects one output from many inputs
    Answer: C) It converts data into binary form

11. **Q11**: A half-adder adds two binary digits and outputs:
    A) Sum and carry
    B) Difference and carry
    C) Quotient and remainder
    D) Product and sum
    Answer: A) Sum and carry

12. **Q12**: In a 4-bit binary addition, what will the carry-out be when adding 1011 and 0111?
    A) 1
    B) 0
    C) 2

D) None
Answer: A) 1

13. **Q13**: A full adder can add:
    A) Two binary digits only
    B) Three binary digits
    C) Four binary digits
    D) Five binary digits
    Answer: B) Three binary digits

14. **Q14**: In unsigned binary arithmetic, the range of values for an 8-bit binary number is:
    A) 0 to 15
    B) 0 to 31
    C) 0 to 255
    D) 0 to 512
    Answer: C) 0 to 255

15. **Q15**: The output of a 4-bit binary subtractor is:
    A) 2-bit sum
    B) 4-bit difference
    C) 8-bit difference
    D) 2-bit product
    Answer: B) 4-bit difference

16. **Q16**: Which of the following is used for error detection in digital communication?
    A) Encoder
    B) Adder
    C) Parity Generator
    D) Decoder
    Answer: C) Parity Generator

17. **Q17**: A full subtractor has:
    A) One input and two outputs
    B) Two inputs and two outputs
    C) Three inputs and two outputs
    D) Four inputs and one output
    Answer: C) Three inputs and two outputs

18. **Q18**: Which circuit performs the operation of binary-to-decimal conversion?
    A) Multiplexer
    B) Demultiplexer
    C) Encoder
    D) Decoder
    Answer: D) Decoder

19. **Q19**: The sum output of a full adder is represented by which Boolean expression?
    A) $A \oplus B$
    B) $A + B$
    C) $A \oplus B \oplus Cin$

D) AB + Cin
Answer: C) A ⊕ B ⊕ Cin

20. **Q20**: Which type of adder is used in microprocessors to perform binary addition?
    A) Half-adder
    B) Full-adder
    C) Parallel adder
    D) Ripple-carry adder
    Answer: D) Ripple-carry adder

21. **Q21**: In signed binary arithmetic, the 2's complement of 1001 is:
    A) 0110
    B) 1101
    C) 0111
    D) 1011
    Answer: C) 0111

22. **Q22**: The primary function of a decoder is:
    A) Multiplying binary numbers
    B) Dividing binary numbers
    C) Decoding a binary input into a specific output line
    D) Combining inputs
    Answer: C) Decoding a binary input into a specific output line

23. **Q23**: In an 8-to-3 encoder, the number of input lines is:
    A) 8
    B) 3
    C) 16
    D) 32
    Answer: A) 8

24. **Q24**: What is the carry-out when adding binary numbers 101 and 111?
    A) 1
    B) 0
    C) 2
    D) 3
    Answer: A) 1

25. **Q25**: Which gate is used in constructing the sum part of a half adder?
    A) AND gate
    B) OR gate
    C) XOR gate
    D) NOR gate
    Answer: C) XOR gate

26. **Q26**: Which gate is used in constructing the carry part of a half adder?
    A) OR gate
    B) AND gate
    C) XOR gate

D) NOR gate
Answer: B) AND gate

27. **Q27**: In a binary subtraction of 1111 and 1001, the result is:
    A) 0101
    B) 0010
    C) 0110
    D) 0111
    Answer: C) 0110

28. **Q28**: A 2-to-4 decoder has how many output lines?
    A) 2
    B) 4
    C) 8
    D) 16
    Answer: B) 4

29. **Q29**: The most significant bit (MSB) in a binary number indicates:
    A) The least value
    B) The highest value
    C) The sign (positive or negative)
    D) None of the above
    Answer: C) The sign (positive or negative)

30. **Q30**: Which of the following is true about a multiplexer?
    A) It has many outputs and a single input
    B) It selects one input line and sends it to one output
    C) It adds two binary numbers
    D) It stores binary data
    Answer: B) It selects one input line and sends it to one output

31. **Q31**: In a full subtractor, the borrow-out is expressed as:
    A) A ⊕ B
    B) B + Cin
    C) A'B + A'Cout
    D) A'Cout + B

    Answer: C) A'B + A'Cout

32. **Q32**: How many XOR gates are required for a 2-bit binary addition?
    A) 1
    B) 2
    C) 3
    D) 4
    Answer: B) 2

33. **Q33**: What is the function of a priority encoder?
    A) Adds two binary numbers
    B) Assigns priority to each input line and encodes based on priority

C) Decodes input data
D) Multiplexes input signals
Answer: B) Assigns priority to each input line and encodes based on priority

34. **Q34**: In binary subtraction, 1001 - 101 is:
A) 0100
B) 1001
C) 0110
D) 1100
Answer: C) 0110

35. **Q35**: Which of the following devices is used for data routing in digital circuits?
A) Multiplexer
B) Demultiplexer
C) Encoder
D) Both A and B
Answer: D) Both A and B

36. **Q36**: Which type of counter increments its state with each clock pulse?
A) Asynchronous Counter
B) Synchronous Counter
C) Ripple Counter
D) Binary Counter
Answer: B) Synchronous Counter

37. **Q37**: The 2’s complement of 1100 is:
A) 0011
B) 1111
C) 0100
D) 1010
Answer: D) 1010

38. **Q38**: Which logic circuit converts binary numbers into their decimal equivalent?
A) Multiplexer
B) Encoder
C) Decoder
D) Comparator
Answer: C) Decoder

39. **Q39**: A parity bit is added to a binary number to ensure:
A) Error detection
B) Error correction
C) Faster processing
D) Binary multiplication
Answer: A) Error detection

40. **Q40**: Which of the following devices can be used to implement a binary multiplier?
A) Full adder
B) Encoder

C) Decoder
D) Multiplexer
Answer: A) Full adder

Section 2.3: Sequential Logic Circuits (40 MCQs)

Key Topics 2.3

- RS Flip-Flops, Gated Flip-Flops, Edge Triggered Flip-Flops, Master-Slave Flip-Flops.
- Types of Registers, Applications of Shift Registers.
- Asynchronous and Synchronous Counters.

MCQs 2.3

1. **Q1**: Which of the following is a type of Flip-Flop?
   A) OR Flip-Flop
   B) RS Flip-Flop
   C) AND Flip-Flop
   D) XOR Flip-Flop
   Answer: B) RS Flip-Flop

2. **Q2**: A Flip-Flop is a type of:
   A) Combinational Circuit
   B) Sequential Circuit
   C) Arithmetic Circuit
   D) Logic Gate
   Answer: B) Sequential Circuit

3. **Q3**: The output of an RS Flip-Flop when both inputs are 1 is:
   A) Set
   B) Reset
   C) No Change
   D) Invalid
   Answer: D) Invalid

4. **Q4**: Which Flip-Flop is known as a “latch” because it retains its state until inputs change?
   A) SR Flip-Flop
   B) D Flip-Flop
   C) JK Flip-Flop
   D) T Flip-Flop
   Answer: A) SR Flip-Flop

5. **Q5**: A Master-Slave Flip-Flop is used to:
   A) Generate random numbers
   B) Solve race conditions
   C) Store multi-bit data
   D) Act as an adder
   Answer: B) Solve race conditions

6. **Q6**: A D Flip-Flop is primarily used for:
   A) Storage of one bit of data
   B) Multiplying binary numbers
   C) Performing binary addition
   D) Converting decimal to binary
   Answer: A) Storage of one bit of data

7. **Q7**: The difference between asynchronous and synchronous counters is:
   A) Asynchronous counters use a single clock, while synchronous counters use multiple clocks
   B) Asynchronous counters use multiple clocks, while synchronous counters use a single clock
   C) Asynchronous counters are faster than synchronous counters
   D) Both counters use the same type of clock
   Answer: B) Asynchronous counters use multiple clocks, while synchronous counters use a single clock

8. **Q8**: A shift register is used for:
   A) Storing data
   B) Shifting data left or right
   C) Multiplexing data
   D) Converting analog signals to digital
   Answer: B) Shifting data left or right

9. **Q9**: Which Flip-Flop changes state only on the clock edge?
   A) Edge-triggered Flip-Flop
   B) SR Flip-Flop
   C) RS Flip-Flop
   D) JK Flip-Flop
   Answer: A) Edge-triggered Flip-Flop

10. **Q10**: In a JK Flip-Flop, when both J and K inputs are 1, the output will:
    A) Set
    B) Reset
    C) Toggle
    D) Remain unchanged
    Answer: C) Toggle

11. **Q11**: A counter that counts downwards is called a:
    A) Binary counter
    B) Up-counter
    C) Down-counter
    D) Ripple counter
    Answer: C) Down-counter

12. **Q12**: Which of the following counters does not require a clock pulse?
    A) Asynchronous counter
    B) Synchronous counter
    C) Ripple counter
    D) Johnson counter
    Answer: A) Asynchronous counter

13. **Q13**: A T Flip-Flop has two stable states and toggles its output when:
    A) Clock pulse is applied
    B) Set input is high
    C) Reset input is low
    D) Input equals 1
    Answer: A) Clock pulse is applied

14. **Q14**: In a 4-bit synchronous counter, how many Flip-Flops are required?
    A) 1
    B) 2
    C) 3
    D) 4
    Answer: D) 4

15. **Q15**: What type of counter has feedback from the output to its input, often creating a repeating sequence?
    A) Johnson counter
    B) Ripple counter
    C) Asynchronous counter
    D) Binary counter
    Answer: A) Johnson counter

16. **Q16**: The total number of states in a 3-bit binary counter is:
    A) 3
    B) 6
    C) 7
    D) 8
    Answer: D) 8

17. **Q17**: A register used to shift binary data to the right is called a:
    A) Left shift register
    B) Right shift register
    C) Parallel register
    D) Serial register
    Answer: B) Right shift register

18. **Q18**: What is the primary function of a flip-flop in sequential logic?
    A) Add numbers
    B) Perform logical operations
    C) Store binary data
    D) Control power levels
    Answer: C) Store binary data

19. **Q19**: Which type of counter increments on the rising edge of the clock signal?
    A) Synchronous counter
    B) Asynchronous counter
    C) Ripple counter

D) Decade counter
Answer: A) Synchronous counter

20. **Q20**: A counter that recycles through a sequence of states is called:
    A) Binary counter
    B) Ring counter
    C) Modulo counter
    D) Up-down counter
    Answer: B) Ring counter

21. **Q21**: A Johnson counter is an example of:
    A) A ripple counter
    B) A synchronous counter
    C) An asynchronous counter
    D) A shift register counter
    Answer: D) A shift register counter

22. **Q22**: A counter that counts both upwards and downwards is known as:
    A) Johnson counter
    B) Ring counter
    C) Up-down counter
    D) Modulus counter
    Answer: C) Up-down counter

23. **Q23**: In a JK Flip-Flop, when both J and K inputs are 0, the output will:
    A) Set
    B) Reset
    C) Toggle
    D) Remain the same
    Answer: D) Remain the same

24. **Q24**: In a 3-bit ripple counter, how many states will the counter go through before repeating?
    A) 4
    B) 6
    C) 8
    D) 16
    Answer: C) 8

25. **Q25**: A register that stores data bits and can shift them either left or right is known as a:
    A) Shift register
    B) Ring counter
    C) Flip-Flop
    D) Up-counter
    Answer: A) Shift register

26. **Q26**: The major disadvantage of an asynchronous counter is:
    A) It is slow
    B) It is expensive
    C) It is complex to design

D) It requires many flip-flops
Answer: A) It is slow

27. **Q27**: The output of a JK Flip-Flop toggles when both inputs are:
    A) 0
    B) 1
    C) Inverted
    D) Complemented
    Answer: B) 1

28. **Q28**: Which Flip-Flop is primarily used to avoid race conditions?
    A) JK Flip-Flop
    B) D Flip-Flop
    C) T Flip-Flop
    D) Master-Slave Flip-Flop
    Answer: D) Master-Slave Flip-Flop

29. **Q29**: A Flip-Flop that changes state on the falling edge of the clock is called:
    A) Rising-edge-triggered Flip-Flop
    B) Falling-edge-triggered Flip-Flop
    C) Level-triggered Flip-Flop
    D) Latch
    Answer: B) Falling-edge-triggered Flip-Flop

30. **Q30**: A counter that counts in binary coded decimal (BCD) format is called a:
    A) Binary counter
    B) BCD counter
    C) Ring counter
    D) Ripple counter
    Answer: B) BCD counter

31. **Q31**: How many Flip-Flops are needed to build a 4-bit shift register?
    A) 2
    B) 3
    C) 4
    D) 8
    Answer: C) 4

32. **Q32

**: Which type of register shifts its bits in one direction, either left or right, for each clock pulse?
A) Parallel register
B) Shift register
C) Serial register
D) Ring register
Answer: B) Shift register

33. **Q33**: What is the modulus of a 3-bit binary counter?
    A) 4

B) 6
C) 8
D) 16
Answer: C) 8

34. **Q34**: A T Flip-Flop is essentially a:
A) JK Flip-Flop with J=K=1
B) D Flip-Flop with inverted output
C) SR Flip-Flop with S=R=0
D) SR Flip-Flop with S=R=1
Answer: A) JK Flip-Flop with J=K=1

35. **Q35**: The Johnson counter generates:
A) Even parity
B) A twisted ring sequence
C) Random bits
D) Serial output data
Answer: B) A twisted ring sequence

36. **Q36**: Which of the following Flip-Flops has a clock input?
A) SR Flip-Flop
B) RS Flip-Flop
C) JK Flip-Flop
D) T Flip-Flop
Answer: C) JK Flip-Flop

37. **Q37**: An up-counter counts:
A) Backwards
B) Forwards
C) Randomly
D) In decimal format
Answer: B) Forwards

38. **Q38**: A counter that has feedback paths between certain stages is known as a:
A) Binary counter
B) Ring counter
C) Synchronous counter
D) Asynchronous counter
Answer: B) Ring counter

39. **Q39**: Which type of register can accept parallel input and produce parallel output?
A) Parallel-in Parallel-out (PIPO)
B) Serial-in Serial-out (SISO)
C) Serial-in Parallel-out (SIPO)
D) Parallel-in Serial-out (PISO)
Answer: A) Parallel-in Parallel-out (PIPO)

40. **Q40**: Which of the following types of counters can be used for frequency division?
A) Up-counter

B) Ripple counter
C) Down-counter
D) Modulo counter
Answer: B) Ripple counter

Section 2.4: Microprocessor (40 MCQs)

Key Topics 2.4

- Internal architecture and features of microprocessors.
- Assembly language programming.

MCQs 2.4

1. **Q1**: The microprocessor is primarily responsible for:
   A) Storing data
   B) Performing arithmetic and logic operations
   C) Generating power
   D) Managing input/output devices
   Answer: B) Performing arithmetic and logic operations

2. **Q2**: Which of the following is the primary function of the ALU (Arithmetic Logic Unit)?
   A) Control data flow
   B) Perform calculations
   C) Manage memory
   D) Interface with peripherals
   Answer: B) Perform calculations

3. **Q3**: The control unit in a microprocessor is responsible for:
   A) Storing data
   B) Executing instructions
   C) Directing operations of the processor
   D) Performing arithmetic calculations
   Answer: C) Directing operations of the processor

4. **Q4**: In a microprocessor, the term "bus" refers to:
   A) A type of storage device
   B) A collection of wires for data transfer
   C) A software protocol
   D) A type of microcontroller
   Answer: B) A collection of wires for data transfer

5. **Q5**: The size of the address bus determines:
   A) The speed of the processor
   B) The amount of data processed
   C) The maximum memory capacity
   D) The type of instructions executed
   Answer: C) The maximum memory capacity

6. **Q6**: The 8086 microprocessor has how many bits in its data bus?
   A) 8 bits
   B) 16 bits
   C) 32 bits
   D) 64 bits
   Answer: B) 16 bits

7. **Q7**: Which of the following is not a register in the 8086 microprocessor?
   A) AX
   B) BX
   C) CX
   D) DX
   Answer: None (All options are valid registers in 8086)

8. **Q8**: Assembly language is:
   A) High-level programming language
   B) Machine-specific language
   C) A hardware description language
   D) A form of binary code
   Answer: B) Machine-specific language

9. **Q9**: The instruction "MOV AX, BX" does what?
   A) Moves data from AX to BX
   B) Moves data from BX to AX
   C) Adds AX and BX
   D) Compares AX and BX
   Answer: B) Moves data from BX to AX

10. **Q10**: Which of the following is an example of a control instruction?
    A) ADD
    B) SUB
    C) JMP
    D) MOV
    Answer: C) JMP

11. **Q11**: The segment register is used to:
    A) Store data
    B) Define the location of instructions in memory
    C) Manage I/O operations
    D) Control the ALU
    Answer: B) Define the location of instructions in memory

12. **Q12**: In 8086 microprocessor architecture, the instruction pointer (IP) register is used for:
    A) Storing data
    B) Addressing I/O devices
    C) Pointing to the next instruction to be executed
    D) Storing status flags
    Answer: C) Pointing to the next instruction to be executed

13. **Q13**: The process of converting an assembly language program into machine code is called:
    A) Compilation
    B) Interpretation
    C) Assembling
    D) Linking
    Answer: C) Assembling

14. **Q14**: The primary function of the stack in a microprocessor is to:
    A) Store all data permanently
    B) Temporarily store data and addresses
    C) Increase processing speed
    D) Perform arithmetic operations
    Answer: B) Temporarily store data and addresses

15. **Q15**: A hardware interrupt:
    A) Is generated by a software instruction
    B) Occurs due to an external device
    C) Cannot be handled by the CPU
    D) Always stops the CPU immediately
    Answer: B) Occurs due to an external device

16. **Q16**: Which of the following is used to identify a particular operation in assembly language?
    A) Operand
    B) Opcode
    C) Register
    D) Memory address
    Answer: B) Opcode

17. **Q17**: The microprocessor architecture that includes pipelining is known as:
    A) Von Neumann Architecture
    B) Harvard Architecture
    C) RISC Architecture
    D) CISC Architecture
    Answer: C) RISC Architecture

18. **Q18**: In assembly language, the directive "ORG" is used to:
    A) Define a variable
    B) Set the origin address
    C) Execute a jump
    D) Allocate memory
    Answer: B) Set the origin address

19. **Q19**: The instruction "PUSH AX" does what?
    A) Moves the value of AX to memory
    B) Removes the value from the stack
    C) Adds AX to the stack
    D) Pushes the value of AX onto the stack
    Answer: D) Pushes the value of AX onto the stack

20. **Q20**: The number of address lines in a microprocessor determines the:
    A) Speed
    B) Performance
    C) Number of instructions
    D) Memory addressing capability
    Answer: D) Memory addressing capability

21. **Q21**: In a microprocessor, the term "fetch-execute cycle" refers to:
    A) The method of storing data
    B) The process of executing instructions
    C) The sequence of fetching and executing instructions
    D) The method of interrupt handling
    Answer: C) The sequence of fetching and executing instructions

22. **Q22**: The function of the status register in a microprocessor is to:
    A) Store the next instruction
    B) Indicate the result of the last operation
    C) Manage memory access
    D) Control data flow
    Answer: B) Indicate the result of the last operation

23. **Q23**: The instruction that combines the contents of two registers and stores the result in one of them is:
    A) ADD
    B) SUB
    C) MOV
    D) XOR
    Answer: A) ADD

24. **Q24**: In assembly language, which directive is used to reserve storage space?
    A) DB
    B) DW
    C) RES
    D) EQU
    Answer: C) RES

25. **Q25**: Which of the following is a common feature of the Intel 8086 microprocessor?
    A) It has a 32-bit data bus
    B) It supports both 16-bit and 32-bit operations
    C) It uses a Harvard architecture
    D) It has built-in graphics capabilities
    Answer: B) It supports both 16-bit and 32-bit operations

26. **Q26**: The memory address in a microprocessor is specified using:
    A) Data lines
    B) Address lines
    C) Control lines
    D) Status lines
    Answer: B) Address lines

27. **Q27**: The process of connecting different types of components to a microprocessor is known as:
    A) Bus interfacing
    B) Device control
    C) Data transfer
    D) Signal routing
    Answer: A) Bus interfacing

28. **Q28**: The maximum addressable memory for a microprocessor with a 20-bit address bus is:
    A) 1 MB
    B) 2 MB
    C) 4 MB
    D) 16 MB
    Answer: A) 1 MB

29. **Q29**: In assembly language programming, what does the instruction "CMP AX, BX" do?
    A) Compares AX and BX
    B) Moves the value of BX to AX
    C) Adds AX and BX
    D) Subtracts BX from AX
    Answer: A) Compares AX and BX

30. **Q30**: The instruction set of a microprocessor is:
    A) A set of hardware connections
    B) The software required to operate the microprocessor
    C) A collection of commands that the processor can execute
    D) The number of operations a microprocessor can perform
    Answer: C) A collection of commands that the processor can execute

31. **Q31**: The data register is used to:
    A) Hold the address of the next instruction
    B) Store intermediate results during processing
    C

) Manage input/output operations
D) Define the execution order of instructions
Answer: B) Store intermediate results during processing

32. **Q32**: The instruction "CALL" in assembly language is used for:
    A) Jumping to a subroutine
    B) Returning from a subroutine
    C) Comparing two values
    D) Calling an external function
    Answer: A) Jumping to a subroutine

33. **Q33**: In assembly language, the directive "END" signifies:
    A) The end of a program
    B) The end of a subroutine
    C) The end of a data segment

D) The end of an instruction
Answer: A) The end of a program

34. **Q34**: What is the function of the stack pointer (SP) register?
    A) Points to the current instruction
    B) Points to the top of the stack
    C) Holds the status flags
    D) Defines the size of the stack
    Answer: B) Points to the top of the stack

35. **Q35**: Which type of addressing mode uses the contents of a register to access data?
    A) Direct addressing
    B) Indirect addressing
    C) Register addressing
    D) Immediate addressing
    Answer: C) Register addressing

36. **Q36**: In a microprocessor, an interrupt is used to:
    A) Stop the current execution
    B) Allow other programs to run
    C) Signal a hardware event
    D) Start a new program
    Answer: C) Signal a hardware event

37. **Q37**: The 8086 microprocessor can be classified as a:
    A) 8-bit processor
    B) 16-bit processor
    C) 32-bit processor
    D) 64-bit processor
    Answer: B) 16-bit processor

38. **Q38**: Which instruction in assembly language is used to stop the execution of a program?
    A) HALT
    B) STOP
    C) END
    D) RET
    Answer: A) HALT

39. **Q39**: The assembly instruction "DEC" is used for:
    A) Decrementing a value
    B) Dividing two values
    C) Declaring a variable
    D) Defining a constant
    Answer: A) Decrementing a value

40. **Q40**: The microprocessor's clock speed is measured in:
    A) Hertz (Hz)
    B) Bits
    C) Bytes

D) Megabytes (MB)
Answer: A) Hertz (Hz)

Section 2.5: Microprocessor System (40 MCQs)

Key Topics

- Memory device classification and hierarchy.
- Interfacing I/O and memory.
- Introduction to Programmable Peripheral Interface (PPI), Serial Interface, DMA, and DMA Controllers.

MCQs

1. **Q1**: The primary function of memory in a microprocessor system is to:
   A) Perform calculations
   B) Store data and instructions
   C) Control input/output devices
   D) Generate power
   Answer: B) Store data and instructions

2. **Q2**: Which of the following is considered volatile memory?
   A) ROM
   B) Flash memory
   C) RAM
   D) Magnetic tape
   Answer: C) RAM

3. **Q3**: The hierarchy of memory devices typically starts with:
   A) Cache memory
   B) Secondary storage
   C) Main memory (RAM)
   D) Registers
   Answer: D) Registers

4. **Q4**: The purpose of cache memory is to:
   A) Store all data permanently
   B) Increase the speed of data access
   C) Backup data
   D) Manage memory allocation
   Answer: B) Increase the speed of data access

5. **Q5**: In a microprocessor system, the term "I/O interface" refers to:
   A) The method of storing data
   B) The connection between the microprocessor and peripherals
   C) The control signals
   D) The address bus
   Answer: B) The connection between the microprocessor and peripherals

6. **Q6**: Which device is used to convert parallel data to serial data?
   A) Multiplexer
   B) Demultiplexer
   C) Serial-to-parallel converter
   D) Parallel-to-serial converter
   Answer: D) Parallel-to-serial converter

7. **Q7**: The programmable peripheral interface (PPI) is primarily used for:
   A) Memory expansion
   B) Input/output device interfacing
   C) Data storage
   D) Instruction execution
   Answer: B) Input/output device interfacing

8. **Q8**: Which type of memory is non-volatile and can be electrically erased and reprogrammed?
   A) ROM
   B) EEPROM
   C) RAM
   D) Cache memory
   Answer: B) EEPROM

9. **Q9**: Direct Memory Access (DMA) is used to:
   A) Allow peripherals to access the memory without CPU intervention
   B) Increase the CPU processing speed
   C) Provide memory backup
   D) Control the execution of programs
   Answer: A) Allow peripherals to access the memory without CPU intervention

10. **Q10**: In a microprocessor system, the term "memory-mapped I/O" refers to:
    A) Using separate address spaces for memory and I/O
    B) Mapping I/O devices to the same address space as memory
    C) A method of direct data transfer
    D) Connecting memory directly to the CPU
    Answer: B) Mapping I/O devices to the same address space as memory

11. **Q11**: Which of the following is a characteristic of synchronous transmission?
    A) Data is sent one bit at a time
    B) It uses start and stop bits
    C) It requires a clock signal for synchronization
    D) Data is sent in random order
    Answer: C) It requires a clock signal for synchronization

12. **Q12**: The main advantage of using DMA is:
    A) Faster data transfer rates
    B) Simplicity in programming
    C) Reduced CPU load
    D) Increased memory size
    Answer: C) Reduced CPU load

13. **Q13**: In a serial interface, data is transmitted:
    A) All at once
    B) One bit at a time
    C) In parallel
    D) Randomly
    Answer: B) One bit at a time

14. **Q14**: The 8255 is an example of:
    A) A microprocessor
    B) A programmable peripheral interface
    C) A memory chip
    D) A type of RAM
    Answer: B) A programmable peripheral interface

15. **Q15**: Which of the following best describes a "bus" in a microprocessor system?
    A) A type of software
    B) A channel for data transfer between components
    C) A memory unit
    D) A control signal
    Answer: B) A channel for data transfer between components

16. **Q16**: The use of interrupts in a microprocessor system is mainly for:
    A) Increasing speed
    B) Efficiently handling events
    C) Data storage
    D) Control unit management
    Answer: B) Efficiently handling events

17. **Q17**: The address space of a microprocessor defines:
    A) The maximum processing speed
    B) The range of memory addresses that can be accessed
    C) The types of instructions that can be executed
    D) The size of the data bus
    Answer: B) The range of memory addresses that can be accessed

18. **Q18**: The key advantage of using a microprocessor with a higher bit width is:
    A) More complex programming
    B) Increased memory capacity
    C) Faster processing speed
    D) More I/O connections
    Answer: B) Increased memory capacity

19. **Q19**: The role of a DMA controller is to:
    A) Manage all CPU operations
    B) Transfer data directly between I/O devices and memory
    C) Execute instructions
    D) Store data permanently
    Answer: B) Transfer data directly between I/O devices and memory

20. **Q20**: Which of the following describes a demultiplexer?
    A) It combines multiple inputs into one output
    B) It routes a single input to multiple outputs
    C) It converts parallel data to serial data
    D) It transfers data from memory to CPU
    Answer: B) It routes a single input to multiple outputs

21. **Q21**: In which of the following transmission types is the data sent as a continuous stream?
    A) Parallel transmission
    B) Asynchronous transmission
    C) Synchronous transmission
    D) Serial transmission
    Answer: C) Synchronous transmission

22. **Q22**:

What type of memory is used for storing firmware?
A) RAM
B) ROM
C) Cache memory
D) Virtual memory
Answer: B) ROM

23. **Q23**: The primary purpose of the I/O controller in a microprocessor system is to:
    A) Manage memory
    B) Control input and output devices
    C) Execute instructions
    D) Perform arithmetic operations
    Answer: B) Control input and output devices

24. **Q24**: The maximum data transfer rate in a parallel interface is determined by:
    A) The number of data lines
    B) The clock frequency
    C) The distance between devices
    D) The type of devices connected
    Answer: A) The number of data lines

25. **Q25**: What does the term "throughput" refer to in a microprocessor system?
    A) The amount of data processed per unit of time
    B) The speed of the processor
    C) The size of the memory
    D) The number of instructions executed
    Answer: A) The amount of data processed per unit of time

26. **Q26**: A microprocessor with a 16-bit data bus can transfer data in how many bits at a time?
    A) 8 bits
    B) 16 bits
    C) 32 bits

D) 64 bits
Answer: B) 16 bits

27. **Q27**: In a memory hierarchy, which memory type is the fastest?
    A) ROM
    B) Cache memory
    C) Main memory
    D) Secondary storage
    Answer: B) Cache memory

28. **Q28**: The term "latency" in a microprocessor context refers to:
    A) The time it takes to transfer data
    B) The delay in processing instructions
    C) The speed of the clock
    D) The distance between devices
    Answer: A) The time it takes to transfer data

29. **Q29**: The function of a buffer in a microprocessor system is to:
    A) Store data permanently
    B) Manage power supply
    C) Temporarily hold data during transfer
    D) Increase processing speed
    Answer: C) Temporarily hold data during transfer

30. **Q30**: A microprocessor's architecture that allows multiple data paths is known as:
    A) Single-core architecture
    B) Multi-core architecture
    C) SIMD architecture
    D) MIMD architecture
    Answer: B) Multi-core architecture

31. **Q31**: The main disadvantage of using asynchronous transmission is:
    A) It requires a clock signal
    B) It is slower than synchronous transmission
    C) It is more complex
    D) It has lower data integrity
    Answer: B) It is slower than synchronous transmission

32. **Q32**: The control bus in a microprocessor system is used for:
    A) Data transfer
    B) Addressing memory
    C) Sending control signals
    D) Power management
    Answer: C) Sending control signals

33. **Q33**: The instruction "IN" is used to:
    A) Output data to a device
    B) Input data from a device
    C) Move data between registers

D) Perform arithmetic operations
Answer: B) Input data from a device

34. **Q34**: A characteristic of memory devices is their:
    A) Speed
    B) Size
    C) Power consumption
    D) All of the above
    Answer: D) All of the above

35. **Q35**: Which of the following is an example of a secondary storage device?
    A) RAM
    B) Hard disk
    C) Cache memory
    D) Register
    Answer: B) Hard disk

36. **Q36**: The main advantage of using RAM in a microprocessor system is:
    A) It is non-volatile
    B) It has a fast access speed
    C) It is permanent storage
    D) It is inexpensive
    Answer: B) It has a fast access speed

37. **Q37**: The purpose of the interrupt vector table is to:
    A) Store the addresses of interrupt service routines
    B) Define the types of interrupts
    C) Manage memory allocation
    D) Control data flow
    Answer: A) Store the addresses of interrupt service routines

38. **Q38**: In a microprocessor system, "address decoding" is used to:
    A) Identify the memory location for data access
    B) Generate control signals
    C) Convert addresses to data
    D) Improve processing speed
    Answer: A) Identify the memory location for data access

39. **Q39**: Which type of DMA is used for burst mode transfer?
    A) Cycle stealing
    B) Transparent DMA
    C) Block transfer DMA
    D) Round-robin DMA
    Answer: C) Block transfer DMA

40. **Q40**: The term "peripheral" in a microprocessor system refers to:
    A) The main processor
    B) The primary memory
    C) Any device that connects to the microprocessor

D) The internal components of the microprocessor
Answer: C) Any device that connects to the microprocessor

Section 2.6: Interrupt Operations (40 MCQs)

Key Topics 2.6

- Interrupts, Interrupt Service Routine (ISR), and Interrupt Processing.

MCQs 2.6

1. **Q1**: An interrupt is:
   A) A signal to stop processing
   B) A method to increase CPU speed
   C) A signal that temporarily halts the CPU to allow the execution of a specific routine
   D) A command to fetch data from memory
   Answer: C) A signal that temporarily halts the CPU to allow the execution of a specific routine

2. **Q2**: The routine that handles an interrupt is called:
   A) Interrupt Vector
   B) Interrupt Handler
   C) Interrupt Service Routine (ISR)
   D) Interrupt Queue
   Answer: C) Interrupt Service Routine (ISR)

3. **Q3**: Which type of interrupt occurs due to an event external to the processor?
   A) Software interrupt
   B) Hardware interrupt
   C) Timer interrupt
   D) Exception interrupt
   Answer: B) Hardware interrupt

4. **Q4**: The process of temporarily halting the CPU to respond to an interrupt is known as:
   A) Context switching
   B) Interrupt handling
   C) Interrupt processing
   D) Interrupt servicing
   Answer: A) Context switching

5. **Q5**: In a microprocessor, an interrupt request (IRQ) is:
   A) A software-generated signal
   B) A hardware-generated signal
   C) A type of control signal
   D) An instruction to stop processing
   Answer: B) A hardware-generated signal

6. **Q6**: Which of the following best describes a "maskable interrupt"?
   A) An interrupt that cannot be ignored

B) An interrupt that can be enabled or disabled
C) An interrupt that occurs at a fixed time interval
D) An interrupt generated by software
Answer: B) An interrupt that can be enabled or disabled

7. **Q7**: When an interrupt occurs, the microprocessor:
   A) Immediately stops executing the current program
   B) Completes the current instruction before handling the interrupt
   C) Restarts the program from the beginning
   D) Sends an error signal
   Answer: B) Completes the current instruction before handling the interrupt

8. **Q8**: The main purpose of an interrupt is to:
   A) Increase processing speed
   B) Allow the CPU to perform other tasks
   C) Provide real-time processing capabilities
   D) All of the above
   Answer: D) All of the above

9. **Q9**: In a microprocessor system, the interrupt vector table is used to:
   A) Store the addresses of interrupt service routines
   B) Queue the interrupts
   C) Manage memory allocation
   D) Control data transfer
   Answer: A) Store the addresses of interrupt service routines

10. **Q10**: Which of the following types of interrupts is triggered by the completion of an I/O operation?
    A) Software interrupt
    B) External interrupt
    C) Timer interrupt
    D) I/O interrupt
    Answer: D) I/O interrupt

11. **Q11**: The term "interrupt latency" refers to:
    A) The time taken to process an interrupt
    B) The time delay between the occurrence of an interrupt and the start of its service
    C) The total time for the CPU to handle all interrupts
    D) The time required to execute an ISR
    Answer: B) The time delay between the occurrence of an interrupt and the start of its service

12. **Q12**: In a prioritized interrupt system, higher priority interrupts are:
    A) Ignored
    B)

Processed first
C) Processed last
D) Always masked
Answer: B) Processed first

13. **Q13**: A "non-maskable interrupt" (NMI) is one that:
    A) Can be ignored
    B) Must be processed immediately
    C) Is generated by the software
    D) Is triggered by a timer
    Answer: B) Must be processed immediately

14. **Q14**: During interrupt processing, the microprocessor saves the state of the registers in order to:
    A) Increase processing speed
    B) Prevent data loss
    C) Ensure the program can resume correctly
    D) Reduce power consumption
    Answer: C) Ensure the program can resume correctly

15. **Q15**: Which type of interrupt is generated by the CPU itself?
    A) Hardware interrupt
    B) Software interrupt
    C) External interrupt
    D) Timer interrupt
    Answer: B) Software interrupt

16. **Q16**: In which scenario would a timer interrupt be generated?
    A) When a key is pressed
    B) When an I/O operation is completed
    C) At regular time intervals
    D) When a program starts
    Answer: C) At regular time intervals

17. **Q17**: The main disadvantage of using interrupts is:
    A) They slow down the CPU
    B) They require additional hardware
    C) They can lead to complex programming and debugging
    D) They consume more memory
    Answer: C) They can lead to complex programming and debugging

18. **Q18**: The process of enabling and disabling interrupts is managed by:
    A) The CPU
    B) The operating system
    C) The interrupt controller
    D) The memory
    Answer: B) The operating system

19. **Q19**: Which of the following is an example of a software interrupt?
    A) Timer interrupt
    B) I/O interrupt
    C) System call
    D) Power failure
    Answer: C) System call

20. **Q20**: When a non-maskable interrupt occurs, the CPU:
    A) Ignores it
    B) Disables all other interrupts
    C) Immediately processes it
    D) Returns to the previous task
    Answer: C) Immediately processes it

21. **Q21**: In a microprocessor, interrupts are primarily used for:
    A) Memory management
    B) Task scheduling
    C) I/O operations
    D) All of the above
    Answer: D) All of the above

22. **Q22**: Which of the following allows the CPU to handle multiple interrupts?
    A) Interrupt queue
    B) Priority levels
    C) Interrupt vector
    D) All of the above
    Answer: D) All of the above

23. **Q23**: The signal sent by a device to request service from the CPU is known as:
    A) Interrupt
    B) Acknowledge
    C) Request signal
    D) Service signal
    Answer: A) Interrupt

24. **Q24**: The purpose of an interrupt controller is to:
    A) Manage interrupt requests from multiple devices
    B) Increase CPU speed
    C) Store data temporarily
    D) Generate control signals
    Answer: A) Manage interrupt requests from multiple devices

25. **Q25**: The interrupt service routine (ISR) must be:
    A) Long and complex
    B) Short and efficient
    C) Written in assembly language
    D) Never called
    Answer: B) Short and efficient

26. **Q26**: Which type of interrupt would most likely be generated by a keyboard?
    A) Timer interrupt
    B) I/O interrupt
    C) Power failure interrupt
    D) Software interrupt
    Answer: B) I/O interrupt

27. **Q27**: Which of the following statements about interrupts is false?
    A) They can increase the efficiency of the CPU.
    B) They can cause context switching.
    C) They are always processed immediately.
    D) They can be prioritized.
    Answer: C) They are always processed immediately.

28. **Q28**: The action taken by the CPU after servicing an interrupt is to:
    A) Restart the program from the beginning
    B) Return to the next instruction after the interrupted program
    C) Execute all ISRs again
    D) Shut down
    Answer: B) Return to the next instruction after the interrupted program

29. **Q29**: Which type of interrupt allows for real-time processing?
    A) Timer interrupt
    B) I/O interrupt
    C) Software interrupt
    D) All of the above
    Answer: D) All of the above

30. **Q30**: The term "stack" in the context of interrupts refers to:
    A) The memory space used for permanent storage
    B) The area used to save the state of registers during interrupts
    C) The method of executing ISRs
    D) The data bus
    Answer: B) The area used to save the state of registers during interrupts

31. **Q31**: A "vector" in interrupt handling refers to:
    A) The direction of data transfer
    B) The memory address of the ISR
    C) The type of interrupt
    D) The processing speed
    Answer: B) The memory address of the ISR

32. **Q32**: Which of the following best describes a "context switch"?
    A) Switching between different types of memory
    B) Changing the execution context of a program
    C) The process of storing and restoring the state of a CPU
    D) Altering the data bus
    Answer: C) The process of storing and restoring the state of a CPU

33. **Q33**: What happens if an interrupt occurs while an ISR is executing?
    A) The ISR is ignored
    B) The ISR completes before processing the new interrupt
    C) The new interrupt is processed immediately
    D) The system crashes
    Answer: B) The ISR completes before processing the new interrupt

34. **Q34**: The CPU can handle multiple interrupts by using:
    A) An interrupt queue
    B) A single priority level
    C) A timer
    D) A context switch
    Answer: A) An interrupt queue

35. **Q35**: In a typical interrupt-driven I/O system, the CPU is free to perform other tasks while:
    A) Waiting for an interrupt
    B) Executing the current program
    C) Processing an ISR
    D) Managing memory
    Answer: A) Waiting for an interrupt

36. **Q36**: An interrupt that is not acknowledged is called:
    A) Masked interrupt
    B) Unhandled interrupt
    C) Latent interrupt
    D) Ignored interrupt
    Answer: B) Unhandled interrupt

37. **Q37**: When handling interrupts, the main goal is to:
    A) Maximize CPU utilization
    B) Minimize the time spent in ISRs
    C) Increase the number of interrupts
    D) Decrease memory usage
    Answer: B) Minimize the time spent in ISRs

38. **Q38**: The state of the CPU when an interrupt occurs is called:
    A) Context
    B) Register state
    C) Interrupt state
    D) Program state
    Answer: A) Context

39. **Q39**: The main advantage of using hardware interrupts over software interrupts is:
    A) They are easier to implement
    B) They can be processed faster
    C) They require less memory
    D) They are more reliable
    Answer: B) They can be processed faster

40. **Q40**: When an interrupt occurs, the CPU saves the state of the registers to:
    A) RAM
    B) Cache
    C) The stack
    D) The hard disk
    Answer: C) The stack