1. Introduction to Microcontrollers

1. **What is the primary component of a microcontroller?**
    - A) I/O devices only
    - B) CPU, memory, and I/O peripherals
    - C) Sensors and actuators
    - D) None of the above
      Answer: B
2. **Which of the following technologies are used in the fabrication of microcontrollers?**
    - A) LSI and VLSI
    - B) VHDL
    - C) System-on-Chip
    - D) CMOS only
      Answer: A
3. **Microcontrollers are primarily used in which type of systems?**
    - A) General-purpose computing
    - B) Embedded systems
    - C) Server systems
    - D) High-performance computing
      Answer: B

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2. Microcontroller vs Microprocessor

4. **What differentiates a microprocessor from a microcontroller?**
    - A) A microprocessor contains peripherals, while a microcontroller does not.
    - B) A microcontroller contains peripherals and memory, while a microprocessor does not.
    - C) Both are similar in functionality.
    - D) None of the above
      Answer: B
5. **Which is NOT an application of a microcontroller?**
    - A) Washing machines
    - B) Desktop PCs
    - C) Robotics

- D) Smart devices
  Answer: B

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3. 8051 Pin Configuration

6. **How many pins does the 8051 microcontroller have?**
   - A) 20
   - B) 40
   - C) 24
   - D) 64
     Answer: B
7. **What is the purpose of Pin 40 in the 8051 microcontroller?**
   - A) Oscillator input
   - B) Power supply
   - C) Interrupt input
   - D) Serial communication
     Answer: B
8. **Which port in the 8051 microcontroller is used for address and data multiplexing?**
   - A) Port 1
   - B) Port 2
   - C) Port 3
   - D) Port 0
     Answer: D
9. **Pin 9 (RST) of 8051 microcontroller is active:**
   - A) High
   - B) Low
   - C) Bidirectional
   - D) None of the above
     Answer: A
10. **Port 3 pins in 8051 microcontrollers are used for:**
    - A) General-purpose I/O only
    - B) Special functions like serial communication and interrupts
    - C) Power supply

- D) Address latch enable
  Answer: B

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4. Addressing Modes

11. **How many addressing modes are there in the 8051 microcontroller?**
    - A) 3
    - B) 5
    - C) 6
    - D) 8
      Answer: B
12. **Which addressing mode specifies the operand directly in the instruction?**
    - A) Immediate addressing mode
    - B) Direct addressing mode
    - C) Register indirect addressing mode
    - D) Indexed addressing mode
      Answer: A
13. **What symbol is used for register indirect addressing?**
    - A) %
    - B) @
    - C) #
    - D) &
      Answer: B
14. **In indexed addressing mode, the source operand is located in the:**
    - A) Accumulator
    - B) Program memory
    - C) RAM
    - D) Stack memory
      Answer: B
15. **Which addressing mode allows efficient memory access for program instructions?**
    - A) Register addressing
    - B) Indirect addressing
    - C) Indexed addressing

- D) Immediate addressing
  Answer: C

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5. Instruction Set and Programming

16. **Which instruction transfers data from the accumulator to Port 1?**
    - A) MOV A, P1
    - B) MOV P1, A
    - C) ADD A, P1
    - D) MOVX A, P1
      Answer: B
17. **The instruction MUL AB in the 8051 microcontroller:**
    - A) Multiplies two 16-bit numbers
    - B) Multiplies two 8-bit numbers stored in A and B
    - C) Adds two numbers
    - D) Divides two numbers
      Answer: B
18. **How many arithmetic instructions are there in the 8051 instruction set?**
    - A) 12
    - B) 24
    - C) 18
    - D) 30
      Answer: B
19. **What does the instruction ADD A, R0 do?**
    - A) Adds the content of R0 to accumulator
    - B) Transfers data from R0 to accumulator
    - C) Multiplies the content of R0
    - D) Subtracts R0 from accumulator
      Answer: A
20. **Which instruction swaps the nibbles in the accumulator?**
    - A) SWAP A
    - B) RL A
    - C) XCHG A

- D) NOP
  Answer: A

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6. Timers and Serial Communication

21. **How many modes are available in 8051 timers?**
    - A) 1
    - B) 2
    - C) 3
    - D) 4
      Answer: D
22. **What is the function of the TMOD register?**
    - A) Controls serial communication
    - B) Selects timer modes
    - C) Enables interrupts
    - D) Stores data
      Answer: B
23. **Which register is used for serial communication in the 8051?**
    - A) TMOD
    - B) TCON
    - C) SCON
    - D) PCON
      Answer: C
24. **What does the term "baud rate" refer to?**
    - A) Clock speed of the microcontroller
    - B) Data transfer rate in serial communication
    - C) Number of I/O pins
    - D) Frequency of interrupts
      Answer: B
25. **What is a full-duplex serial communication?**
    - A) Data can only be sent
    - B) Data can only be received
    - C) Data can be sent and received simultaneously

- D) None of the above
  Answer: C

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7. Interrupts

26. **How many interrupts (including RESET) are available in 8051?**
    - A) 3
    - B) 5
    - C) 6
    - D) 8
      Answer: C
27. **What is the purpose of the IE register in the 8051?**
    - A) Enable or disable specific interrupts
    - B) Store vector addresses
    - C) Configure serial ports
    - D) Control timers
      Answer: A
28. **When an interrupt occurs, the 8051 microcontroller:**
    - A) Completes the current instruction
    - B) Saves the program counter on the stack
    - C) Jumps to the ISR
    - D) All of the above
      Answer: D
29. **Which interrupt has the highest priority in the 8051?**
    - A) Timer 0
    - B) External Interrupt 1
    - C) RESET
    - D) Serial Communication
      Answer: C
30. **What instruction is used to return from an ISR?**
    - A) RET
    - B) RETI
    - C) JMP

- D) END
  Answer: B

8. Addressing Modes and Examples

31. **Which of the following is an example of direct addressing mode?**
    - A) MOV A, #55H
    - B) MOV A, 20H
    - C) MOV @R0, A
    - D) MOVC A, @A+DPTR
      Answer: B
32. **What does the instruction MOV A, #20H do?**
    - A) Moves the value at memory address 20H to accumulator
    - B) Moves the immediate value 20H to accumulator
    - C) Transfers data from Port 2 to accumulator
    - D) None of the above
      Answer: B
33. **Which register is used in indexed addressing mode?**
    - A) Accumulator
    - B) DPTR
    - C) Program Counter
    - D) R0
      Answer: B
34. **In register addressing mode, the operand is:**
    - A) A memory address
    - B) An immediate value
    - C) A specific register
    - D) Indirectly accessed
      Answer: C
35. **What type of instruction is MOVX A, @DPTR?**
    - A) Register addressing
    - B) Direct addressing
    - C) External data memory addressing
    - D) Indexed addressing
      Answer: C

9. Instruction Set: Arithmetic Operations

36. **Which arithmetic instruction subtracts with borrow?**
    - A) SUB
    - B) SUBB
    - C) SUBX
    - D) SBB
      Answer: B

37. **What is the result of the instruction MUL AB if A = 5 and B = 3?**
    - A) A = 15
    - B) A = 8
    - C) A = 5, B = 3
    - D) A = 0
      Answer: A

38. **The DEC instruction in 8051:**
    - A) Increments a value by 1
    - B) Decrements a value by 1
    - C) Divides the accumulator by 2
    - D) Multiplies two registers
      Answer: B

39. **Which of the following is NOT an arithmetic instruction in 8051?**
    - A) ADD
    - B) ADDC
    - C) INC
    - D) ORL
      Answer: D

40. **The result of DIV AB is stored in:**
    - A) Accumulator (A)
    - B) Register B
    - C) Both A and B
    - D) External RAM
      Answer: C

10. Logical Instructions

41. **Which logical instruction performs a bitwise AND operation?**
    - A) ANL
    - B) ORL
    - C) XRL
    - D) SWAP
      Answer: A

42. **The instruction CPL A performs:**
    - A) Complements the accumulator
    - B) Clears the accumulator
    - C) Shifts the accumulator left
    - D) No operation
      Answer: A

43. **What is the effect of the SWAP A instruction?**
    - A) Reverses the bits of the accumulator
    - B) Exchanges the lower and upper nibbles of the accumulator
    - C) Clears the accumulator
    - D) Adds the accumulator and B register
      Answer: B

44. **Which instruction rotates the bits of the accumulator left?**
    - A) RL A
    - B) RLC A
    - C) RR A
    - D) ORL A
      Answer: A

45. **Which of the following is a logical NOT operation in 8051?**
    - A) ANL
    - B) ORL
    - C) CPL
    - D) XRL
      Answer: C

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11. Timers and Modes

46. **What is the maximum count value for a 16-bit timer in the 8051?**
    - A) 256
    - B) 1024
    - C) 65535
    - D) 32768
      Answer: C

47. **What does the instruction SETB TR0 do?**
    - A) Stops Timer 0
    - B) Enables Timer 0
    - C) Starts Timer 1
    - D) Disables interrupts
      Answer: B

48. **Which register is used to configure timer modes in the 8051?**
    - A) TCON
    - B) TMOD
    - C) IE
    - D) SCON
      Answer: B

49. **In Mode 2, the timer operates as:**
    - A) A 16-bit timer
    - B) A 13-bit timer
    - C) An 8-bit auto-reload timer
    - D) A counter
      Answer: C

50. **Which bit in the TCON register indicates Timer 0 overflow?**
    - A) TF0
    - B) TF1
    - C) IE0
    - D) IT1
      Answer: A

---

12. Interrupt Handling

51. **What is the vector address for the Timer 1 interrupt in 8051?**

- A) 0013H
- B) 0003H
- C) 000BH
- D) 001BH
  Answer: C

52. **Which instruction is executed at the end of an ISR?**
    - A) JMP
    - B) RET
    - C) RETI
    - D) MOV
      Answer: C
53. **What is the function of the IE register in interrupt handling?**
    - A) Sets interrupt priority
    - B) Enables or disables specific interrupts
    - C) Configures timer modes
    - D) Stores vector table addresses
      Answer: B
54. **Which type of interrupt is triggered by external hardware?**
    - A) Software interrupt
    - B) Hardware interrupt
    - C) Reset interrupt
    - D) Internal interrupt
      Answer: B
55. **What happens when an interrupt is triggered in 8051?**
    - A) The processor completes the current instruction.
    - B) The program counter is saved on the stack.
    - C) The ISR is executed.
    - D) All of the above.
      Answer: D

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13. Serial Communication

56. **What is the baud rate determined by in the 8051?**
    - A) Timer configuration

- B) TCON register
- C) Oscillator frequency
- D) SCON register
  Answer: C

57. **Which register in 8051 holds serial data for transmission or reception?**
    - A) SCON
    - B) SBUF
    - C) PCON
    - D) IE
      Answer: B
58. **How many modes of serial communication are supported by the 8051?**
    - A) 2
    - B) 4
    - C) 6
    - D) 8
      Answer: B
59. **In half-duplex communication:**
    - A) Data is sent and received simultaneously.
    - B) Data is sent in one direction at a time.
    - C) Data is always received first.
    - D) None of the above.
      Answer: B
60. **What is the primary difference between synchronous and asynchronous communication?**
    - A) Synchronous uses a clock; asynchronous does not.
    - B) Asynchronous is faster than synchronous.
    - C) Synchronous communication is only for short distances.
    - D) None of the above.
      Answer: A

4. 8051 Instruction Set and Programming

61. **Which of the following instructions transfers data from the accumulator to Port 1?**
    - A) MOV A, P1
    - B) MOV P1, A

- C) ADD A, P1
- D) MOVX A, P1
  Answer: B

62. **What does the instruction ADD A, R0 do?**
    - A) Adds the contents of R0 to the accumulator
    - B) Transfers data from R0 to the accumulator
    - C) Multiplies the contents of R0
    - D) Subtracts R0 from the accumulator
      Answer: A
63. **What is the mnemonic for multiplication in the 8051 instruction set?**
    - A) MUL
    - B) ADDC
    - C) SUB
    - D) DIV
      Answer: A
64. **How many opcodes are there in the arithmetic group of the 8051?**
    - A) 12
    - B) 24
    - C) 18
    - D) 30
      Answer: B
65. **What does the instruction INC A do?**
    - A) Increments the contents of the accumulator by 1
    - B) Increments the value of the memory location pointed to by DPTR
    - C) Adds an immediate value to the accumulator
    - D) None of the above
      Answer: A

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5. Timers and Serial Ports

66. **How many modes are available in the 8051 timer?**
    - A) 1
    - B) 2
    - C) 3

- D) 4
  Answer: D

67. **Which timer mode operates as a 16-bit timer?**
    - A) Mode 0
    - B) Mode 1
    - C) Mode 2
    - D) Mode 3
      Answer: B

68. **What is the function of the TR1 bit in the TCON register?**
    - A) Starts Timer 0
    - B) Starts Timer 1
    - C) Enables external interrupts
    - D) Clears Timer 1
      Answer: B

69. **Which register is used to set the baud rate in serial communication?**
    - A) SCON
    - B) TMOD
    - C) PCON
    - D) IE
      Answer: C

70. **What is the default communication mode of the 8051 serial port?**
    - A) Mode 0
    - B) Mode 1
    - C) Mode 2
    - D) Mode 3
      Answer: B

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6. Interrupts in 8051

71. **How many interrupts (including RESET) are available in the 8051?**
    - A) 3
    - B) 5
    - C) 6

- D) 8
  Answer: C

72. **What happens when an interrupt is triggered in the 8051?**
    - A) The microcontroller completes the current instruction
    - B) The program counter is pushed onto the stack
    - C) The ISR executes
    - D) All of the above
      Answer: D
73. **Which interrupt has the lowest priority in the 8051?**
    - A) Timer 0
    - B) Serial communication
    - C) External Interrupt 0
    - D) Timer 1
      Answer: B
74. **What is the role of the EA bit in the IE register?**
    - A) Enables or disables all interrupts
    - B) Clears the timer flags
    - C) Sets the serial communication mode
    - D) None of the above
      Answer: A
75. **What does the instruction RETI do?**
    - A) Returns from an ISR and restores the program counter
    - B) Disables all interrupts
    - C) Clears the timer overflow flag
    - D) None of the above
      Answer: A

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7. Logical Operations

76. **Which logical operation performs an AND operation on the accumulator?**
    - A) ANL
    - B) ORL
    - C) XRL

- D) CPL
  Answer: A

77. **The CPL instruction complements the contents of which register?**
    - A) PSW
    - B) PC
    - C) Accumulator
    - D) DPTR
      Answer: C
78. **Which instruction interchanges the nibbles of the accumulator?**
    - A) SWAP A
    - B) RL A
    - C) MOVC A
    - D) XCHG A
      Answer: A
79. **What is the purpose of the XRL instruction in the 8051?**
    - A) Performs an XOR operation
    - B) Performs a shift operation
    - C) Rotates the accumulator
    - D) None of the above
      Answer: A
80. **Which of the following instructions is a rotate instruction?**
    - A) RLC A
    - B) XRL A
    - C) ORL A
    - D) ANL A
      Answer: A

8. 8051 Pin Configuration

81. **Which pin is used for resetting the 8051 microcontroller?**
    - A) Pin 31
    - B) Pin 9
    - C) Pin 20
    - D) Pin 40
      Answer: B

82. **What is the function of Port 0 when external memory is connected?**
    - A) Address and data multiplexing
    - B) Timer input
    - C) General-purpose I/O
    - D) Serial communication
      Answer: A

83. **Which port does not have internal pull-up resistors?**
    - A) Port 0
    - B) Port 1
    - C) Port 2
    - D) Port 3
      Answer: A

84. **What is the function of the ALE pin in the 8051 microcontroller?**
    - A) Enables interrupts
    - B) Provides the clock signal
    - C) Latches the address/data signals
    - D) Acts as a reset pin
      Answer: C

85. **Which pins are used to connect an external oscillator to the 8051 microcontroller?**
    - A) Pin 30 and 31
    - B) Pin 18 and 19
    - C) Pin 1 and 2
    - D) Pin 39 and 40
      Answer: B

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9. Addressing Modes in Depth

86. **Which register is used for indirect addressing in the 8051?**
    - A) R0 and R1
    - B) DPTR
    - C) PSW
    - D) Accumulator
      Answer: A

87. **What type of addressing mode uses the instruction MOV A, #55H?**

- A) Immediate addressing
- B) Direct addressing
- C) Indirect addressing
- D) Indexed addressing
  Answer: A

88. **Indexed addressing is primarily used to access:**
    - A) External data memory
    - B) Program memory
    - C) Stack memory
    - D) Registers
      Answer: B
89. **Which instruction accesses program memory using the indexed addressing mode?**
    - A) MOVX A, @DPTR
    - B) MOV A, R0
    - C) MOVC A, @A+DPTR
    - D) MOV @R1, A
      Answer: C
90. **What is the advantage of using indirect addressing?**
    - A) Requires fewer instructions
    - B) Provides flexible data access
    - C) Reduces program size
    - D) All of the above
      Answer: D

---

10. Advanced Instruction Set Questions

91. **Which instruction is used to exchange data between the accumulator and a register?**
    - A) MOV A, R0
    - B) XCH A, R0
    - C) XRL A, R0
    - D) ORL A, R0
      Answer: B
92. **What does the CJNE instruction do?**

- A) Clears the accumulator
- B) Jumps if the two values are not equal
- C) Jumps unconditionally
- D) None of the above
  Answer: B

93. **Which instruction performs bitwise AND operation between the accumulator and a port?**
    - A) ANL A, P0
    - B) ORL A, P0
    - C) XRL A, P0
    - D) ADD A, P0
      Answer: A
94. **How is the accumulator affected by the RR A instruction?**
    - A) It is rotated left by one bit
    - B) It is rotated right by one bit
    - C) It is cleared
    - D) None of the above
      Answer: B
95. **Which of the following is NOT a valid data transfer instruction?**
    - A) MOV A, #55H
    - B) MOVX A, @DPTR
    - C) DIV AB
    - D) XCH A, @R1
      Answer: C

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11. Interrupts and ISR

96. **What is the role of the Interrupt Vector Table in the 8051?**
    - A) Stores the program counter
    - B) Holds addresses of ISRs
    - C) Configures interrupt priorities
    - D) Saves the stack pointer
      Answer: B
97. **Which bit in the IE register must be set to enable all interrupts?**

- A) EA
- B) ES
- C) EX0
- D) IT1
  Answer: A

98. **What happens to the program counter when an interrupt occurs?**
    - A) It resets to 0000H
    - B) It is pushed onto the stack
    - C) It jumps to the ISR address
    - D) Both B and C
      Answer: D

99. **Which interrupt is associated with serial communication in the 8051?**
    - A) INT0
    - B) INT1
    - C) Timer 1
    - D) RI/TI
      Answer: D

100. **What is the vector address for external interrupt 1 in the 8051?**
- A) 0003H
- B) 000BH
- C) 0013H
- D) 001BH

Answer: C