ESIOT

Unit-2

Practice Questions

1. When an interrupt is enabled, then where does the pointer moves immediately after this interrupt has occurred?

(a) to the next instruction which is to be executed
(b) to the first instruction of ISR
(c) to a fixed location in memory called interrupt vector table
(d) to the end of the program

Answer: **(c)**

2. After RETI instruction is executed then the pointer will move to which location in the program?

(a) next interrupt of the interrupt vector table
(b) immediate next instruction where interrupt is occurred
(c) next instruction after the RETI in the memory
(d) none of the mentioned

Answer: **(b)**

3. Which bit of the IE register is used to enable TxD/RxD interrupt?

(a) IE.D5
(b) IE.D2
(c) IE.D3
(d) IE.D4

Answer: **(d)**

4. Which of the following is an external interrupt?

(a) INT0(active low)
(b) INT2(active low)
(c) Timer0 interrupt
(d) Timer1 interrupt

Answer: **(a)**

5. When we add two numbers the destination address must always be.
a) some immediate data
b) any register

c) accumulator
d) memory

Answer: **(c)**

6. If SUBB A,R4 is executed, then actually what operation is being applied?
a) R4+A
b) R4-A
c) A-R4
d) R4+A

Answer: **(c)**

7. ANL instruction is used _____
a) to AND the contents of the two registers
b) to mask the status of the bits
c) all of the mentioned
d) none of the mentioned

Answer: **(c)**

8. XRL, ORL, ANL commands have _____
a) accumulator as the destination address and any register, memory or any immediate data as the source address
b) accumulator as the destination address and any immediate data as the source address
c) any register as the destination address and accumulator, memory or any immediate data as the source address
d) any register as the destination address and any immediate data as the source address

Answer: **(a)**

9. Which of the following is not an instruction of 8051 instructions?
a) arithmetic instructions
b) boolean instructions
c) logical instructions
d) none

Answer: **(d)**

10. The logical instruction that affects the carry flag during its execution is
a) XRL A;
b) ANL A;
c) ORL A;
d) RLC A;

Answer: **(d)**

Pin configuration of 8051, ports and addressing modes

1. Describe the general function and features of the 8051 microcontroller.

Answer: The 8051 microcontroller is a widely used 8-bit microcontroller, popular in embedded systems. It features a Harvard architecture, integrating a CPU, RAM, ROM, and various peripherals on a single chip. The microcontroller comes in a 40-pin dual in-line package (DIP), offering multiple input and output options for external device communication. It has four I/O ports, each with 8 pins configurable as input or output based on the logic state.

2. What are the functions of pins 1 to 8 in the 8051 microcontroller?

Answer: Pins 1 to 8 are designated as Port 1 (P1.0 to P1.7) and are used for simple I/O operations. These bidirectional pins can function as input or output based on the applied logic. When logic 0 is applied, the pin acts as an output, and when logic 1 is applied, it acts as an input.

3. Explain the role of Pin 9 (RST) in the 8051 microcontroller.

Answer: Pin 9, also known as the Reset pin (RST), is an active-high input pin. If the RST pin remains high for at least two machine cycles, the microcontroller will reset, terminating all ongoing activities and initializing to its default state. This pin is often referred to as the "power-on-reset" pin, used to reset the microcontroller upon powering up.

4. What additional functions do the Port 3 pins (Pins 10 to 17) serve in the 8051 microcontroller?

Answer: In addition to being general I/O pins (P3.0 to P3.7), the Port 3 pins have several specialized functions:

- P3.0 (RXD) - Serial data receive
- P3.1 (TXD) - Serial data transmit
- P3.2 (INT0) - External hardware interrupt 0
- P3.3 (INT1) - External hardware interrupt 1
- P3.4 (T0) - Timer 0 external input
- P3.5 (T1) - Timer 1 external input
- P3.6 (WR) - External memory write
- P3.7 (RD) - External memory read

5. Describe the function of Pins 18 and 19 (XTAL2 and XTAL1) in the 8051 microcontroller.

Answer: Pins 18 (XTAL2) and 19 (XTAL1) are connected to an external quartz crystal oscillator, which provides the microcontroller with an external clock frequency ranging from 4 MHz to 30 MHz. This external clock is essential for the timing and synchronization of the microcontroller's operations.

6. What is the purpose of Pin 20 (GND) in the 8051 microcontroller?

Answer: Pin 20 (GND) is the ground pin of the 8051 microcontroller. It must be connected to a 0V power supply, serving as the reference point for all voltage levels in the microcontroller.

7. Explain the dual role of Port 2 pins (Pins 21 to 28) in the 8051 microcontroller.

Answer: The Port 2 pins (P2.0 to P2.7) serve as general-purpose I/O pins and higher-order address lines when the microcontroller is interfaced with external memory. When additional external memory is used, these pins handle the higher-order address bytes, facilitating memory access and data management.

8. What is the function of Pin 29 (PSEN) in the 8051 microcontroller?

Answer: Pin 29 (PSEN) stands for Program Store Enable and is an active-low output pin. It is used to read external memory. In systems using the 8031 variant of the 8051 microcontroller, where the program code is stored in external ROM, the PSEN pin connects to the Output Enable (OE) pin of the ROM, allowing the microcontroller to fetch instructions from the external memory.

9. Describe the role of Pin 30 (ALE/PROG) in the 8051 microcontroller.

Answer: Pin 30 (ALE/PROG) serves dual purposes:

- Address Latch Enable (ALE): It is used to distinguish between memory chips when multiple memory chips are used, and to de-multiplex the multiplexed address and data signals available at Port 0.
- Program Pulse Input (PROG): During EPROM programming, this pin acts as the program pulse input.

10. What does Pin 31 (EA/VPP) control in the 8051 microcontroller?

Answer: Pin 31 (EA/VPP) stands for External Access input. It controls the use of external memory. When connected to Vcc, it enables the use of the on-chip ROM of the 8051 microcontroller. For other family members without on-chip ROM (e.g., 8031 and 8032), connecting the EA pin to GND enables the use of external memory for storing programs.

11. Discuss the characteristics and use of Port 0 pins (Pins 32 to 39) in the 8051 microcontroller.

Answer: The Port 0 pins (P0.0 to P0.7) are bidirectional I/O pins with no internal pull-ups, requiring external pull-up resistors. These pins are designated as AD0-AD7 because they multiplex address and data signals to save pins. Port 0 is used for the lower byte of the address when external memory is accessed, and for general I/O operations.

12. What is the significance of Pin 40 (VCC) in the 8051 microcontroller?

Answer: Pin 40 (VCC) provides the necessary power supply voltage (+5V) to the microcontroller, enabling it to operate. This pin must be connected to the positive terminal of the power supply.

13 Explain the concept of bidirectional pins in the context of the 8051 microcontroller.

Answer: Bidirectional pins in the 8051 microcontroller can function as either input or output pins based on the logic state applied to them. When configured as input pins, they can receive data from external devices. When configured as output pins, they can send data to external devices. This flexibility allows for efficient communication and control in embedded systems.

14. Describe the process and importance of resetting the 8051 microcontroller.

Answer: Resetting the 8051 microcontroller involves applying a high signal to the Reset pin (RST) for at least two machine cycles. This process initializes the microcontroller, terminating all current operations and setting the registers and internal memory to their default states. Resetting is crucial for ensuring the microcontroller starts from a known state, particularly after power-on or system errors.

15. How do Port 3 pins handle serial communication in the 8051 microcontroller?

Answer: Port 3 pins P3.0 (RXD) and P3.1 (TXD) handle serial communication. P3.0 is used for receiving serial data (RXD), and P3.1 is used for transmitting serial data (TXD). These pins facilitate the exchange of data between the microcontroller and other serial communication devices, enabling tasks like data logging and communication with peripheral devices.

16. What role do the XTAL1 and XTAL2 pins play in the operation of the 8051 microcontroller?

Answer: The XTAL1 and XTAL2 pins are connected to an external oscillator, typically a quartz crystal. They provide the clock signal required for the microcontroller's operation. This clock signal determines the timing of the microcontroller's operations, ensuring precise execution of instructions and synchronization of internal processes.

17. Explain the function of the PSEN pin in systems using external ROM with the 8051 microcontroller.

Answer: In systems using external ROM, the PSEN (Program Store Enable) pin is used to read the program code stored in the external memory. It connects to the Output Enable (OE) pin of the ROM, allowing the microcontroller to fetch instructions. This setup is crucial for microcontrollers like the 8031, which do not have on-chip ROM and rely entirely on external memory for program storage.

18. How does the ALE/PROG pin assist in memory interfacing and programming in the 8051 microcontroller?

Answer: The ALE (Address Latch Enable) portion of the ALE/PROG pin helps in de-multiplexing the address and data signals from Port 0, allowing the microcontroller to differentiate between addresses and data during memory operations. The PROG portion is used during EPROM programming, where it acts as the program pulse input, enabling the programming of the memory.

19. What is the purpose of using external pull-up resistors with Port 0 pins in the 8051 microcontroller?

Answer: Port 0 pins in the 8051 microcontroller do not have internal pull-up resistors. External pull-up resistors are used to ensure the pins can be pulled to a high logic level (1)

when needed. These resistors are essential for proper operation in both input and output modes, especially when Port 0 is used for address and data multiplexing.

20. Discuss the importance of the VCC pin in the 8051 microcontroller.

Answer: The VCC pin provides the necessary operating voltage (+5V) to the 8051 microcontroller. Without a proper power supply through the VCC pin, the microcontroller cannot function. This pin ensures that all internal circuits and peripherals receive the required power to operate effectively.

21. How do Port 2 pins function when external memory is interfaced with the 8051 microcontroller?

Answer: When external memory is interfaced with the 8051 microcontroller, Port 2 pins (P2.0 to P2.7) serve as higher-order address lines (A8 to A15). These pins are responsible for addressing the external memory, enabling the microcontroller to access larger memory spaces beyond its internal memory capacity.

22. Describe the use of Port 3 pins for external hardware interrupts in the 8051 microcontroller.

Answer: Port 3 pins P3.2 (INT0) and P3.3 (INT1) are used for external hardware interrupts. These interrupts allow the microcontroller to pause its current operations and execute an Interrupt Service Routine (ISR) in response to external events. This functionality is crucial for real-time applications where immediate response to external signals is required.

23.Explain how the 8051 microcontroller's Port 0 is used for address and data multiplexing.

Answer: Port 0 (P0.0 to P0.7) is used for address and data multiplexing in the 8051 microcontroller. During external memory operations, these pins carry both address and data signals. The lower address byte is first sent through Port 0, followed by the data. The ALE signal helps in de-multiplexing these signals, distinguishing between address and data during memory access.

24. What are the addressing modes supported by the 8051 microcontroller?

Answer: The 8051 microcontroller supports several addressing modes:

- Register Addressing Mode
- Direct Addressing Mode
- Register Indirect Addressing Mode
- Immediate Addressing Mode
- Indexed Addressing Mode
- Implied Addressing Mode

These modes determine how the microcontroller accesses data, either from registers, memory, or immediate values.

25. How does the Immediate Addressing Mode function in the 8051 microcontroller?

Answer: In Immediate Addressing Mode, the data to be operated on is provided directly in the instruction itself. This mode is efficient for loading constants into registers. For example, the instruction MOV A, #0AFH loads the hexadecimal value 0AFH directly into the accumulator A. This mode simplifies programming and speeds up data initialization.

26. Write a program to load the value 0xAA into register R3 using immediate addressing mode and then move this value to the accumulator using register addressing mode.

Answer: MOV R3, #0xAA ; Load immediate value 0xAA into R3

MOV A, R3 ; Move the value in R3 to the accumulator

27. Assume R0 contains the address 30H. Write a program to load the value at memory location 30H into the accumulator using register indirect addressing mode.

Answer: MOV R0, #30H ; Load the address 30H into R0

MOV A, @R0 ; Load the value at memory location 30H into the accumulator

28. Write a program to copy the content of data memory location 60H to 70H using direct addressing mode.

Answer: MOV A, 60H ; Load the value at memory location 60H into the accumulator

MOV 70H, A ; Store the value in the accumulator to memory location 70H

29. Write a program to add the values at data memory locations 20H and 21H and store the result in the accumulator. Use direct addressing mode

Answer: MOV A, 20H ; Load the value at memory location 20H into the accumulator

ADD A, 21H ; Add the value at memory location 21H to the accumulator

30. Write a program to add the values stored at memory locations 40H and 41H and store the result back at memory location 40H

Answer: MOV A, 40H ; Load the value at memory location 40H into the accumulator

ADD A, 41H ; Add the value at memory location 41H to the accumulator

MOV 40H, A ; Store the result back into memory location 40H