**MCQ-questions**

**UNIT-2**

The Assembly Language Programming Process

**1. What is the primary purpose of an assembler in the assembly language programming process?**

a) To execute the program directly  
b) To convert high-level code into binary code  
c) To translate assembly code into machine code  
d) To debug the assembly program

**Answer:** c) To translate assembly code into machine code

**2. Which of the following is NOT a part of the assembly language programming process?**

a) Writing source code  
b) Assembling  
c) Linking and loading  
d) Interpretation of source code

**Answer:** d) Interpretation of source code

**3. In assembly language, which type of file is generated after assembling the source code?**

a) Object file  
b) Executable file  
c) Source file  
d) Binary file

**Answer:** a) Object file

**4. What is the role of a linker in the assembly language programming process?**

a) To link high-level code with machine code  
b) To combine object files into a single executable  
c) To translate assembly code into binary code  
d) To optimize the source code

**Answer:** b) To combine object files into a single executable

**5. Which of the following is an example of an assembly directive?**

a) ADD AX, BX  
b) MOV CX, DX  
c) DB 10H  
d) JMP 1000H

**Answer:** c) DB 10H

**6. What does the term “symbol table” in assembly programming refer to?**

a) A table containing error messages  
b) A table storing addresses of labels and variables  
c) A table listing system calls  
d) A table used for debugging

**Answer:** b) A table storing addresses of labels and variables

**7. Which phase checks for syntax errors in assembly code?**

a) Linker phase  
b) Loader phase  
c) Assembler phase  
d) Execution phase

**Answer:** c) Assembler phase

**8. What does the ORG directive specify in assembly language programming?**

a) It defines a loop structure  
b) It specifies the starting address of the program  
c) It organizes memory segments  
d) It declares variables

**Answer:** b) It specifies the starting address of the program

**9. In assembly programming, what is a macro?**

a) A function written in a high-level language  
b) A predefined block of assembly instructions  
c) A single-step debugger  
d) A memory allocation process

**Answer:** b) A predefined block of assembly instructions

**10. What is the function of the loader in the assembly language process?**

a) To execute the assembly code directly  
b) To load the executable file into memory for execution  
c) To link the source files  
d) To debug the program

**Answer:** b) To load the executable file into memory for execution

### 11.Assembly Language Programming Process

**1. What is the first step in the assembly language programming process?**  
a) Debugging the program  
b) Writing the source code  
c) Linking object files  
d) Loading the program into memory

**Answer:** b) Writing the source code

**12. What does the assembler generate after processing assembly source code?**  
a) Source file  
b) Executable file  
c) Object file  
d) Machine code directly into memory

**Answer:** c) Object file

**13. Which of the following tools converts the assembly language program into machine code?**  
a) Debugger  
b) Compiler  
c) Assembler  
d) Linker

**Answer:** c) Assembler

**14. During the linking process, which files are combined to produce an executable file?**  
a) Source files  
b) Object files and library files  
c) Machine code files  
d) Debug files

**Answer:** b) Object files and library files

**15. What does the loader do in the assembly language programming process?**  
a) Executes the source code directly  
b) Converts object code to assembly code  
c) Loads the executable into memory for execution  
d) Optimizes the code for performance

**Answer:** c) Loads the executable into memory for execution

**Programming Tools**

**16. Which tool is primarily used to debug an assembly language program?**  
a) Linker  
b) Debugger  
c) Loader  
d) Editor

**Answer:** b) Debugger

**17. What is the purpose of a symbolic debugger?**  
a) To optimize assembly code  
b) To execute assembly code directly  
c) To provide a readable mapping between source code and machine code  
d) To assemble the source code

**Answer:** c) To provide a readable mapping between source code and machine code

**18. Which of the following is an integrated tool for editing, assembling, and debugging assembly programs?**  
a) IDE (Integrated Development Environment)  
b) Text editor  
c) Disassembler  
d) Hex editor

**Answer:** a) IDE (Integrated Development Environment)

**Programming Techniques**

**19. Which technique is commonly used in assembly programming to reduce code redundancy?**  
a) Loop unrolling  
b) Macro definition  
c) Inline assembly  
d) Hardcoding

**Answer:** b) Macro definition

**20. What is the primary advantage of using symbolic labels in assembly language programming?**  
a) Improves execution speed  
b) Reduces memory usage  
c) Increases readability and simplifies addressing  
d) Eliminates the need for machine code

**Answer:** c) Increases readability and simplifies addressing

**21. Which directive is used to define constants in assembly language programming?**  
a) ORG  
b) EQU  
c) DB  
d) MOV

**Answer:** b) EQU

**22. What is the purpose of modular programming in assembly language?**  
a) To speed up the execution of the code  
b) To divide the program into reusable and manageable parts  
c) To increase the memory usage  
d) To make the program dependent on a specific processor

**Answer:** b) To divide the program into reusable and manageable parts

**23. Which programming technique ensures the alignment of data in memory for optimized performance?**  
a) Data padding  
b) Address masking  
c) Loop optimization  
d) Instruction pipelining

**Answer:** a) Data padding

**24. Which technique is commonly used for keyboard interfacing in microcontrollers?**

a) Direct connection to the microcontroller  
b) Polling and scanning  
c) Interrupt-driven communication  
d) Both b and c

**Answer:** d) Both b and c

**25.In a matrix keyboard, how are keys arranged?**

a) In a single row  
b) In a single column  
c) In rows and columns  
d) In a random pattern

**Answer:** c) In rows and columns

**26. What is the purpose of a "debouncing circuit" in keyboard interfacing?**

a) To detect multiple key presses  
b) To avoid false triggering caused by mechanical contacts  
c) To amplify the input signal  
d) To scan the keyboard matrix

**Answer:** b) To avoid false triggering caused by mechanical contacts

**27. What is the role of a pull-up resistor in keyboard interfacing?**

a) To limit the current to the microcontroller  
b) To ensure a defined voltage level when no key is pressed  
c) To debounce the input signal  
d) To provide power to the keyboard

**Answer:** b) To ensure a defined voltage level when no key is pressed

**28. What is the typical configuration of a 4x4 matrix keypad?**

a) 4 rows and 4 columns  
b) 8 rows and 1 column  
c) 1 row and 8 columns  
d) 2 rows and 2 columns

**Answer:** a) 4 rows and 4 columns

**29. In a 4x4 matrix keyboard, how many GPIO pins are required to interface it with a microcontroller?**

a) 4  
b) 8  
c) 16  
d) 12

**Answer:** b) 8

**30. What is the primary advantage of using a matrix keypad over individual push buttons?**

a) It requires fewer pins for interfacing  
b) It provides faster input  
c) It is more durable  
d) It eliminates the need for a microcontroller

**Answer:** a) It requires fewer pins for interfacing

**31. Which method can be used to detect multiple key presses in a matrix keyboard?**

a) Row scanning only  
b) Key rollover technique  
c) Interrupt-based scanning  
d) Both b and c

**Answer:** d) Both b and c

**32.What is the function of the "keycode" in keyboard interfacing?**

a) It maps the key press to a specific ASCII value or function  
b) It identifies the location of the key in the matrix  
c) It increases the scanning speed of the keyboard  
d) It provides the mechanical debounce of keys

**Answer:** a) It maps the key press to a specific ASCII value or function

**33. In a keyboard interfacing system, what happens when a key is pressed in a matrix keypad?**

a) A row and column line are connected  
b) A row line goes high  
c) A column line goes low  
d) The entire matrix is reset

**Answer:** a) A row and column line are connected

**34. Why is the "interrupt-driven approach" preferred for keyboards in some applications?**

a) It reduces power consumption by avoiding constant scanning  
b) It simplifies the hardware design  
c) It eliminates the need for debouncing  
d) It avoids false key presses

**Answer:** a) It reduces power consumption by avoiding constant scanning

**35. How is the "ghosting" problem prevented in matrix keyboards?**

a) By adding diodes to each key  
b) By increasing the scan rate  
c) By using more rows and columns  
d) By reducing the number of keys in the matrix

**Answer:** a) By adding diodes to each key

**36. Which communication protocol is often used for interfacing modern keyboards with computers?**

a) SPI  
b) I2C  
c) PS/2 or USB  
d) UART

**Answer:** c) PS/2 or USB

**37. What does a "scan code" represent in keyboard interfacing?**

a) The physical address of a key  
b) The key position in the matrix  
c) A unique code for the key pressed, used by the host device  
d) The ASCII equivalent of the key pressed

**Answer:** c) A unique code for the key pressed, used by the host device

**Interfacing with Displays**

**38. Which type of display is commonly used in embedded systems for alphanumeric characters?**  
a) LCD  
b) LED  
c) OLED  
d) CRT

**Answer:** a) LCD

**39. How is a 7-segment display typically interfaced with a microcontroller?**  
a) Using a parallel connection  
b) Using multiplexing to reduce pin count  
c) Using an SPI interface  
d) Using I2C interface

**Answer:** b) Using multiplexing to reduce pin count

**40. What does the “common anode” configuration in 7-segment displays mean?**  
a) All anodes are connected to ground  
b) All anodes are connected to Vcc  
c) Each segment has a separate anode  
d) Anodes and cathodes are interchangeable

**Answer:** b) All anodes are connected to Vcc

**41. Which of the following is an advantage of an OLED display over an LCD display?**  
a) Requires a backlight  
b) Consumes less power for black pixels  
c) Has a slower refresh rate  
d) Supports fewer colors

**Answer:** b) Consumes less power for black pixels

**42.Which communication protocol is most commonly used for interfacing dot matrix LCDs with microcontrollers?**  
a) UART  
b) Parallel interface  
c) I2C  
d) SPI

**Answer:** c) I2C

**43.How many data pins are required to drive a standard 16x2 LCD in 4-bit mode?**  
a) 4  
b) 6  
c) 8  
d) 10

**Answer:** b) 6

**00000000000000000000000000Digital-to-Analog (D/A) Conversion**

**44. What is the primary purpose of a D/A converter?**  
a) Convert digital signals into analog signals  
b) Convert analog signals into digital signals  
c) Process binary data  
d) Amplify analog signals

**Answer:** a) Convert digital signals into analog signals

**45. Which of the following is a commonly used D/A conversion technique?**  
a) Successive approximation  
b) R-2R ladder network  
c) Delta-sigma modulation  
d) Flash conversion

**Answer:** b) R-2R ladder network

**46. In an R-2R ladder DAC, what is the main advantage of using resistors with values of R and 2R?**  
a) Simplicity of design  
b) Infinite resolution  
c) Requires fewer components  
d) Achieves exact analog output

**Answer:** a) Simplicity of design

**47. The resolution of a D/A converter is determined by:**  
a) The input clock frequency  
b) The number of input digital bits  
c) The reference voltage  
d) The output current

**Answer:** b) The number of input digital bits

**Analog-to-Digital (A/D) Conversion**

**48. What is the purpose of an A/D converter?**  
a) Convert digital signals into analog signals  
b) Convert analog signals into digital signals  
c) Convert binary signals into hexadecimal signals  
d) Process clock signals

**Answer:** b) Convert analog signals into digital signals

**49. Which of the following is a commonly used A/D conversion method?**  
a) Flash conversion  
b) R-2R ladder conversion  
c) Successive approximation  
d) Both a and c

**Answer:** d) Both a and c

**50. In an A/D converter, the term "quantization error" refers to:**  
a) Error caused by clock jitter  
b) Difference between actual analog input and the digital output  
c) Noise introduced by the converter  
d) Overflow during conversion

**Answer:** b) Difference between actual analog input and the digital output

**51. How many voltage levels can a 10-bit A/D converter distinguish?**  
a) 512  
b) 1023  
c) 1024  
d) 2048

**Answer:** c) 1024

**52. What is the purpose of the sample-and-hold circuit in an A/D converter?**  
a) To reduce power consumption  
b) To maintain a stable input voltage during conversion  
c) To amplify the analog input  
d) To reduce quantization error

**Answer:** b) To maintain a stable input voltage during conversion

**53. Which factor determines the speed of an A/D conversion?**  
a) Resolution of the ADC  
b) Reference voltage  
c) Conversion time of the ADC  
d) Input signal amplitude

**Answer:** c) Conversion time of the ADC.

### ****Interfacing with Displays****

**54. Which type of display is commonly used in embedded systems for alphanumeric characters?**  
a) LCD  
b) LED  
c) OLED  
d) CRT

**Answer:** a) LCD

**55. How is a 7-segment display typically interfaced with a microcontroller?**  
a) Using a parallel connection  
b) Using multiplexing to reduce pin count  
c) Using an SPI interface  
d) Using I2C interface

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a) UART  
b) Parallel interface  
c) I2C  
d) SPI

**Answer:** c) I2C

**59.How many data pins are required to drive a standard 16x2 LCD in 4-bit mode?**  
a) 4  
b) 6  
c) 8  
d) 10

**Answer:** b) 6

### ****Digital-to-Analog (D/A) Conversion****

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a) Convert digital signals into analog signals  
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**61.Which of the following is a commonly used D/A conversion technique?**  
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**Answer:** a) Simplicity of design

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**Answer:** b) The number of input digital bits

### ****Analog-to-Digital (A/D) Conversion****

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c) Successive approximation  
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b) Reference voltage  
c) Conversion time of the ADC  
d) Input signal amplitude

**Answer:** c) Conversion time of the ADC

Here are **MCQ questions** covering **Multiple Interrupts** and **Serial Data Communication**:

### ****Multiple Interrupts****

**70. What is the purpose of an interrupt in a microcontroller system?**  
a) To execute instructions sequentially  
b) To handle high-priority events asynchronously  
c) To improve program execution speed  
d) To manage memory allocation

**Answer:** b) To handle high-priority events asynchronously

**71. In a system with multiple interrupts, what is "priority"?**  
a) The order in which interrupts are serviced  
b) The address of the interrupt handler  
c) The clock speed of the processor  
d) The time taken to execute an interrupt

**Answer:** a) The order in which interrupts are serviced

**72. Which of the following hardware features supports multiple interrupts?**  
a) Interrupt Vector Table  
b) Stack Pointer  
c) GPIO Pins  
d) Program Counter

**Answer:** a) Interrupt Vector Table

**73. What is the purpose of an Interrupt Service Routine (ISR)?**  
a) To prioritize tasks in the main program  
b) To handle a specific interrupt when it occurs  
c) To manage memory allocation for interrupts  
d) To transfer data between devices

**Answer:** b) To handle a specific interrupt when it occurs

**74. In a system with nested interrupts, what does "nesting" allow?**  
a) Disabling all interrupts  
b) Servicing higher-priority interrupts during lower-priority ISR execution  
c) Handling interrupts in sequential order  
d) Executing ISRs one at a time

**Answer:** b) Servicing higher-priority interrupts during lower-priority ISR execution

**75. What is a "maskable interrupt"?**  
a) An interrupt that cannot be disabled  
b) An interrupt with no priority  
c) An interrupt that can be disabled by software  
d) An interrupt with the highest priority

**Answer:** c) An interrupt that can be disabled by software

**76. Which of the following interrupts is non-maskable?**  
a) Timer interrupt  
b) Software interrupt  
c) Reset interrupt  
d) UART interrupt

**Answer:** c) Reset interrupt

**77. In a vectored interrupt system, how is the ISR address determined?**  
a) By polling the interrupts  
b) By the interrupt vector table  
c) By the value of the program counter  
d) By software-based priority levels

**Answer:** b) By the interrupt vector table

### ****Serial Data Communication****

**78.What is the key difference between serial and parallel communication?**  
a) Serial sends data bit-by-bit, while parallel sends multiple bits simultaneously  
b) Serial communication requires more pins  
c) Parallel communication is slower than serial  
d) Serial communication is limited to short distances

**Answer:** a) Serial sends data bit-by-bit, while parallel sends multiple bits simultaneously

**79. Which of the following is a standard protocol for serial communication?**  
a) SPI  
b) UART  
c) I2C  
d) All of the above

**Answer:** d) All of the above

**80. What does "baud rate" in serial communication refer to?**  
a) The number of data bits transmitted per second  
b) The number of signal changes per second  
c) The size of the transmitted data packet  
d) The frequency of the clock signal

**Answer:** b) The number of signal changes per second

**81. Which serial communication protocol uses separate lines for clock and data?**  
a) UART  
b) SPI  
c) RS-232  
d) USB

**Answer:** b) SPI

**82. How many devices can be connected in an I2C communication system?**  
a) Only 2  
b) A maximum of 8  
c) Limited by addressing (usually up to 127 or 1024 devices)  
d) Unlimited

**Answer:** c) Limited by addressing (usually up to 127 or 1024 devices)

**83. What does the "start condition" in I2C communication indicate?**  
a) The beginning of data transmission  
b) The termination of data transmission  
c) An error in transmission  
d) A request for acknowledgment

**Answer:** a) The beginning of data transmission

**84. In UART communication, what is the role of the stop bit?**  
a) To signal the start of transmission  
b) To detect errors in transmission  
c) To indicate the end of a data frame  
d) To maintain synchronization between devices

**Answer:** c) To indicate the end of a data frame

**85. Which of the following layers of the OSI model does serial communication primarily operate in?**  
a) Physical layer  
b) Data link layer  
c) Network layer  
d) Application layer

**Answer:** a) Physical layer

**86. What is a parity bit used for in serial communication?**  
a) To control the baud rate  
b) To ensure data integrity by detecting errors  
c) To synchronize the transmitter and receiver  
d) To indicate the start of a data frame

**Answer:** b) To ensure data integrity by detecting errors

**87. In RS-232 communication, what is the typical voltage level for a logic "1"?**  
a) +5V  
b) -12V  
c) +12V  
d) 0V

**Answer:** b) -12V