

15CS44: MICROPROCESSORS AND MICROCONTROLLERS

QUESTION BANK:

MODULE-1

1. Define a microprocessor. Explain in detail the evolution of microprocessor in Microprocessor range from 4004 MP to core-2 system.
2. What is microprocessor? Explain how data, address and control buses inter connect various system components.
3. Explain in detail with a neat figure the working of the internal architecture of the 8086 MP.
4. Draw and discuss the Register Organization of 8086.
5. What is real mode Addressing? Explain default segment and offset registers.
6. Briefly explain various multipurpose registers in 8086.
7. Discuss the functions of segment registers of 8086 with examples. Give some advantages of memory segmentation.
8. Explain the flags of 8086 processors using suitable examples.
9. Describe the memory map of a PC system, with a neat diagram.
10. What is pipelining? How is it achieved in 8086?
11. What do you mean by segment override prefix? Explain the following assembler directives:
 - i) ASSUME
 - ii) SMALL
 - iii) PROC
 - iv) EQU
 - v) LOCAL
12. Write bubble sort program using 8086 assembly instructions.
13. Discuss the following addressing modes with examples:
 - i) Direct
 - ii) Register indirect
 - iii) Base plus index
 - iv) Immediate
 - v) Scaled indexed.

14. Write and explain machine code for instruction MOV DL, [BX].
15. Differentiate between short, near and far jump instructions with two examples of each.
16. Identify the addressing modes of the following instructions and explain them briefly:
 - i) MOV WORD PTR [SI], 20H
 - ii) MOV ES: [1000H], 10H
 - iii) MOV CX, NUM [BX + DI]
17. Explain with an exam~ why and how a 20-bit address is generated in 8086.
18. What are assembler directives? Explain following assembler directives with an example
 - i) PUBLIC
 - ii) ORG
 - iii) DW
 - iv) ASSUME.
19. Explain with example the following assembler directives
 - i) DQ
 - iii) PRO and ENDP
 - iv) TYPE
 - v) EVEN.
20. Explain the following assembler directives with examples
 - i) EXTRN
 - ii) PTR

MODULE 2

1. Describe the following instruction with suitable examples:
 - i) PUSH
 - ii) MUL
 - iii) IN
 - iv) AAA.
2. Explain the following instructions with an example for each:
 - i) LEA
 - ii) XCHG
 - iii) XLAT
 - iv) DAA
 - v) AAA.
3. Describe the following instructions with an example:
 - i) LDS
 - ii) DIV
 - iii) LAHF
 - iv) MUL
 - v) PUSHF
4. Bring out the importance of XLAT instruction using a suitable program.
5. Explain the following instructions with examples:
 - i) CMP
 - ii) LOOP
 - iii) TEST
 - vi) IMUL
6. Give the state of all the status flag bits after the addition of 30A2H with F01CH.
7. What is stack? What is the use of stack memory? Explain the execution of push and pop
8. Explain the execution of PUSH and POP instruction with respect to stack addressing mode

9. Write an ALP using 8086 instructions to generate and add the first 10 even numbers and save the numbers and result in memory location NUM and SUM
10. Write an ALP using 8086 instructions to search a number placed in location array ARRAY. Give suitable messages.
11. Write 8086 ALP to add 10 non-negative data items using string instructions. instructions.
12. With format explain rotate instructions. Give examples to rotate right by 1-bit and rotate
Left by 5-bits.
13. Write an ALP using 8086 instructions to count the numbers of zeros in a given 8-bit number.
14. Write an assembly level program reverse a given string and check for palindrome
15. Explain the various string manipulation instructions with examples.
16. Differentiate between procedures and macros.
17. Write an ALP using 8086 instructions to reverse a four-digit number.
18. Write an 8086 ALP to find the factorial of a given number through recursive Procedure.
19. Write a 8086 ALP to convert a given binary number into its equivalent unpacked decimal and ASCII.
20. Write an 8086 ALP using DOS interrupt to read a two hexadecimal number and display the same on monitor.
21. What are the sources of interrupts? Briefly explain the steps taken by a processor to execute an interrupt instruction
22. Briefly explain handshaking or polling with necessary diagrams.
23. Explain the structure of 8086 interrupt vector table with neat diagram.
24. Draw and discuss the Interrupt structure of 8086.
25. Explain any 3 types of 8086 interrupts

1. List various memory devices.
2. Discuss in brief commonly used memories.
3. Explain memory bank selection in 8086 and mention the number of memory banks in 80x86 MPs.
4. How 8086 microprocessors select 8-bit or 16-bit data from odd and even memory banks.
5. What is flash memory? Explain how flash memory is interfaced to 8086 μ P.
6. What is memory address decoding? Design a memory system for 8086 for the following specifications:
 - i) 32 Kbytes EPROM using 16 Kbyte devices.
 - ii) 64 Kbytes SRAM using 16 Kbyte devices. Draw the memory map.
7. Interface 512 KB RAM to 8088 MP using 64 KB RAM using 3:8 decoder with starting address of memory as 80000H. Clearly mention decoding logic and memory map.
8. Design an 8086-based system to interface with i) 64 Kbyte EPROM; ii) 64 Kbyte RAM. Assume RAM is connected at 30000H and EPROM at F0000H.
9. Interface 8 Kx8 ROM and 4 Kx8 RAM to 8086 microprocessors. Assume the starting address for ROM is 40000H and starting address for RAM is 44000H.
10. Design an 8086-based system with the following specifications:
 - i) 64 Kbyte EPROM; ii) 64 Kbyte RAM. Draw the complete schematic diagram of the design indicating memory map.
11. Differentiate between memory mapped I/O and I/O mapped I/O (isolated I/O).
12. With neat diagram, explain the linear decoding techniques.
13. Explain any two methods of address decoding techniques with schematic diagram.
14. With neat diagram, explain simple NAND gate address decoding logic.
15. Explain how a 3-8-line decoder could be used to interface eight 8 K memory chips.
16. Explain 74138 decoder configurations to enable ports at address E8H to EFH.
17. Explain how 74LS138 decodes 2732 EPROMs for 32 K x 8 section of memory. Assume the starting address is 40000H. Give the detailed memory map.
18. With neat block diagram explain 82C55 PPI. Write the control words for
 - i) PORT A as input, PORT B as output, PORT C as output,
 - ii) PORT A as output, PORT B as input, PORT C as input in simple I/O mode.
19. Explain different signals of 8255 PPI and control words.

20. Explain command word format of 82C55 in mode-0. Write the control word format to initialize PC3 and reset PC7.

21. Explain pin-out of 82C55 along with different operational modes.

22. Interface 8 digit seven segment LED display to 8088 through 8255 PPI.

Write initialization sequence for 8255 with all ports as Output ports in mode 0 and address of device is FF00h.

23. Explain with neat diagram the interfacing of stepper motor to 8086 using 8255 in detail.

24. Write an 8086 ALP to read a byte of data from port A and port B. Add the data and save the result in a memory location.

25. Write an ALP using 8086 instructions to read a byte of data from Port A and display its parity status as 00H or FFH for odd and even parity, on Port B.

MODULE -4

1. What do you mean by RISC architecture?
2. Explain the important design rules of RISC philosophy.
3. Which are the different features of ARM instruction set that make it suitable for embedded applications.
4. With a neat diagram explain the different hardware components of an embedded device based on ARM core.
5. Explain the AMBA bus protocol.
6. Give a detailed account of different types of memories that can be used in embedded systems based on the hierarchy, width and speed.
7. What are memory controllers and interrupt controllers?
8. With a neat diagram explain the different software components of an embedded system.
9. Give different applications of ARM processors.
10. Give the significance of initialization code in an embedded system software.
11. With a neat diagram explain the different general purpose registers of ARM processors.
12. Explain current program status register with neat diagram.
13. What are banked registers.
14. Which are the different conditional flags of ARM processor.
15. Explain ARM 7 pipeline.
16. What are interrupts or exceptions? How are they handled in ARM processors?
17. What are the different techniques of core extensions?

MODULE-5

1. Which are the different data processing instructions of ARM processor?
2. What is a barrel shifter? Which are the different barrel shifter operations?
3. Tabulate barrel shift operation syntax for data processing instructions.
4. Explain in detail Arithmetic instructions. How Barrel shifter is used with Arithmetic instructions.
5. Along with suitable examples describe various logical and comparison instructions.
6. With example illustrate how following instructions work
 - i) MLA
 - ii) MUL
 - iii) SMLAL
 - iv) SMULL
 - v) UMLAL
 - vi) UMULL
7. List and explain different software interrupt instructions and program status register instructions along with their syntax.
8. Which are the different coprocessor instructions.
9. Explain how a 32-bit constant can be loaded in a register.
10. Illustrate with a net diagram Logical shift left operation.

