

Assignment-1

Microprocessor and Microcontroller

Long Answer Questions

1. Differentiate between a microprocessor and a micro controller
2. Differentiate between a microprocessor and digital signal processor
3. List the internal registers in 8086 microprocessor and their abbreviations and lengths.
4. Draw & discuss the internal block diagram of 8086.
5. What do you mean by pipelined architecture? How is it implemented in 8086?
6. Explain the concept of segmented memory? What are its advantages?
7. Explain the function of opcode pre-fetch queue in 8086.
8. How does 8086 differentiate between an opcode and instruction data?
9. Draw and discuss the read and write cycle timing diagrams of 8086 in minimum mode.
10. Draw and discuss the read and write cycle timing diagrams of 8086 in maximum mode
11. Draw & discuss typical minimum mode 8086 systems.
14. State and explain the different instruction formats of 8086.
15. What do you mean by addressing mode? What are the different addressing modes supported by 8086?
16. Explain all addressing modes of 8086 with example.
17. Explain physical address formation in different addressing mode
18. Let the content of the different registers in the 8086 be as follows: DS = 1000H, SS= 2000H, ES=3000H, BX=4000H, SI=5000H, DI=6000H, and BP = 7000H.

Find the memory address/addresses from where the 8086 accesses the data while executing the following instruction:

- (i) MOV AX,[BX]
- (ii) MOV BX,[SI]
- (iii) MOV CX,[BP]
- (iv) MOV AL,[DI]
- (v) MOV BH,SS:[SI]
- (vi) MOV CX,ES:[DI]
- (vii) MOV AX,[BX+DI]
- (viii) MOV BX,[BP+DI+5]

- (ix) MOV AH,[BX+10H]
- (x) MOV CX,DS:[BP+4]
- (xi) MOV BX,[SI-5]
- (xii) MOV AX, [BX+10]

19. Explain operations of the following instruction:

- (i) CBW and CWD (ii) MOV reg, immediate and LEA reg, address
- (ii) DEC AX and SUB AX, 1 (iv) RCL and ROL
- (v) IRET and RET

20. Explain the operation of the loop, LOOPE/LOOPZ, and LOOPNE/LOOPNZ instructions what does the INT n instruction push onto the stack that the CALL FAR instruction does not? What is the JCXZ instruction typically used for?

Short Answer Questions

1. What is the purpose of segment registers in 8086
2. What is assembler?
3. What is loader?
4. What is linker?
5. What are the functions of bus interface unit (BIU) in 8086?
6. Discuss the function of instruction queue in 8086? [
7. What are the different flag available in status register of 8086?
8. State the significance of LOCK signal in 8086?
9. What are the features of Intel 8086 ?
10. What is Instruction cycle?
11. Why data bus is bi-directional? And Address bus uni-directional.
12. Explain the function of M/IO in 8086.
13. differentiate between Software interrupts and Hardware interrupt with suitable example.
14. Explain the difference between a JMP and CALL instruction?
15. What is the difference between instructions MUL & IMUL?
16. If the content of BP=1000 and SI = 2000H, what is the value present in CX after the 8086 executes the instructions LEA CX, [BP+SI], and LEA CX,[SI].
17. The content of the different register in the 8086 is CS = F000H, DS = 1000H, SS = 2000H, and ES=3000H. Find the base address of the different segments in the memory.
18. If the current content of the CS and IP registers is FFFFH and 0000H, respectively from which memory location will the 8086 fetch the data, while executing the instruction MOV CX,[BX]?
19. If the content of the SS and SP registers is 5000H and 1000H, respectively, in which memory location is the content of DX saved, when the 8086 executes the instruction PUSH DX?
20. What is the function of assembler and assembler directives?
21. Is it possible to exchange the content of two memory locations or the content of two segment register using the XCHG instruction? Why?
22. Write the instructions to perform the following operations:
 - (a) Copy content of BX to a memory location in the data segment with offset 0234H
 - (b) Increment content of CX by 1
 - (c) Multiply AX with 16 bit data 2467H

- (d) Rotate left the content of AL by two bits
23. State the difference between SCAS/SCASB/SCASW and LODS/LODSB/LODSW instructions.
24. Find the code for the following instruction using instruction format
- (i) MOV AX, BX if the opcode is given as 100010
- (ii) MOV CX, 4D4C if opcode is 101110
- 25.

Code Segment

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        Assume CS: Code
        MOV     AX, 4000H
        MOV     DS, AX
        MOV     BL, [8000H]
        MOV     AH, 00H
        MOV     AL, 01H
Back:    MUL     BL
        DEC     BL
        JNZ     Back
        MOV     [8001H], AX
        HLT
Code ENDS
        END

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From the given ALP, answer the following (i) What is the value of DS register ? If 8000H has been loaded with 04H, What result is stored in BL and at 8001 H after the execution of the program?

26. Write an assembly language program to load the accumulator with a constant value using 8086 Instruction set.
27. Differentiate between minimum and maximum mode in the context of the 8086 microprocessor.
28. Describe the significance of Moore's Law in the evolution of microprocessors.

Calculate The Physical Address

29. Given SS: 4455H; SP: 1D75H, calculate the physical address

Identify the addressing modes.

30. Identify the addressing modes for the following instructions:

- 1) MOV CL, 34H
- 2) MOV BX, [4172H]
- 3) MOV DS, AX
- 4) MOV AX, [SI + BX + 04]

Analysing the Codes

31. How many times LOOP1 will be executed in the following program? What will be the contents of BL after the execution?

MOV BL, 00H

MOV CL, 05H

LOOP1: ADD BL, 02H

DEC CL

JNZ LOOP1

32. What will be the contents of register BL after the last instruction execution?

MOV BL, 14H

MOV CL, 03H

SHL BL, CL

Identifying the Instructions

33. Explain the following instructions.

i. ROL

ii. MOVS

iii. STD

Identifying Functionality of the Pins

34. State the functions for the following pins of 8086

1. NMI

2. BHE

3. TEST

4. DEN

EXAMPLE ALP Programs

ALP -assembly language program

1. Write an ALP for dividing two 8-bit numbers.
2. Write an ALP to sort the given numbers in descending order.
3. Write an ALP for multiplying two 8-bit numbers.
4. Write an ALP to sort the given numbers in ascending order.
5. Write an ALP for adding two 8-bit numbers.
6. Write an ALP to find the largest number in the given numbers
7. Write an ALP for subtracting two 8-bit numbers.
8. Write an ALP to find the smallest number in the given numbers.
9. Write an ALP for subtracting two 16-bit numbers.
10. Write an ALP for adding two 16-bit numbers.
11. Write an ALP for converting given Hexadecimal ASCII value to graphical value.
12. Write an ALP for converting given hexadecimal value to BCD value.
13. Write an ALP for converting given binary value to ASCII value.
14. Write an ALP for converting given ASCII value to Binary value.
15. Write an ALP to transfer block of data from one location to another.
16. Write assembly language program to find the sum of 5 bytes of data
17. Write an Assembly Language program to count the number of 1's in BL register.
18. Write assembly language program to add two BCD numbers.