SP-3
SP. Showtrv

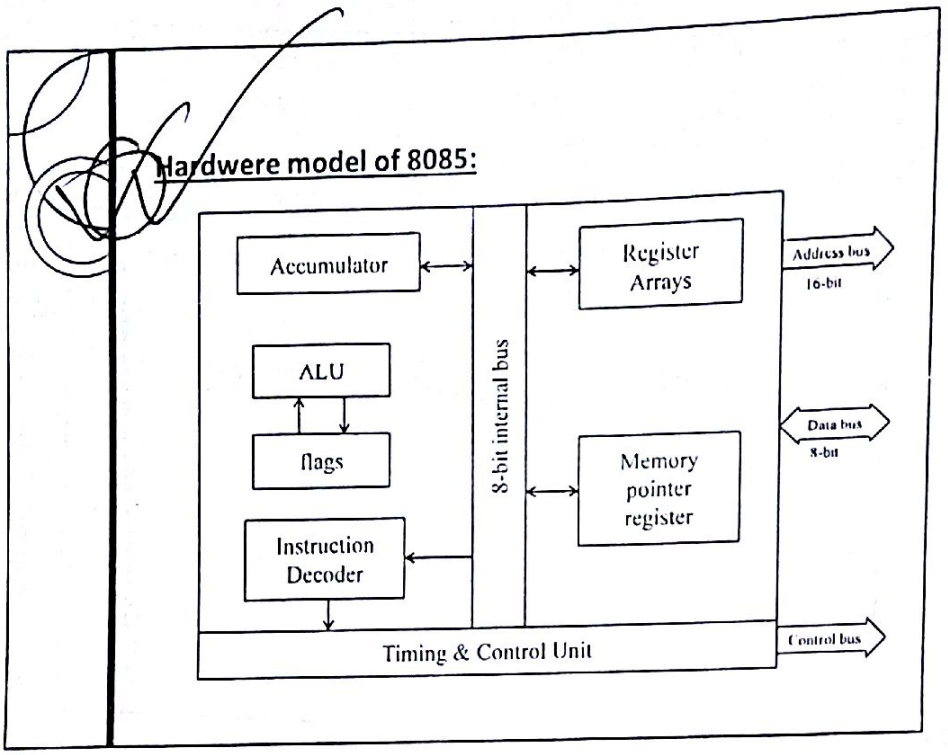
MSA
2/20/2016

8085- MicroProcessor

8085- microprocessor:

- Invented in 1976 by INTEL
- No of transistors 6500
- Frequency 5MHz
- Addressable memory 64K

Hardwere model of 8085:



Accumulator:

- Accumulator is an 8-bit register.
- It is used to store 8-bit data to perform arithmetic and logical operation.
- The result of an operation stored here

Register Arrays:

- 8085 has 6 general purpose registers.
- They are identified as B, C, D, E ,H and L. each 8-bit.
- They can be combined as pairs BC, DE, HL to perform 16-bit operation.

Program Counter (PC):

The microprocessor uses this 16-bit register to sequence the execution of instructions. The function of Program Counter is to point to the memory address from which the next byte (machine code) is fetched.

Instruction register and Decoder:

- When an instruction is loaded from a memory, it is stored in instruction register.
- The decoder decodes the instruction and establish the sequence of some instruction.

Timing and Control Unit:

It generates the control signals necessary for communication between the microprocessor and peripherals.

Flags:

- Flags are five flip flops.
- Flag register is an 8-bit register that stores the output of five flip flops.

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
S	Z		AC		P		CY

Fig: flag register

S = sign flag	0 if result is positive 1 if result is negative
Z = zero flag	1 if result is zero
P = parity flag	1 if result contains even no of 1's 0 if result contains odd no of 1's
CY – Carry Flag	1 if there is a carry/ overflow
AC – Auxiliary Flag	1 if there is a carry between D_3- D_4

Result = 1
Z = 0.
0 → 1
1 → 0
Result = 0
Z = 1

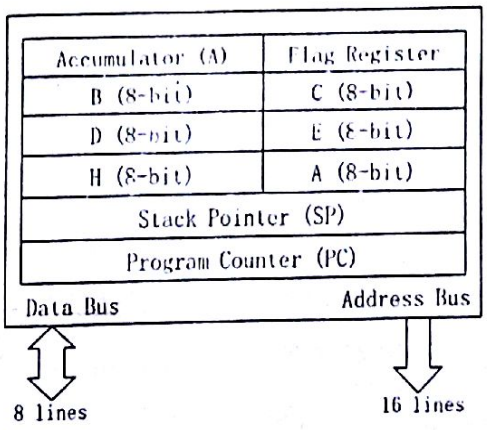
What will be the values of flag register after performing an ADD operation between 3BH and 25H?

Ans:

0011 1011B	3BH
0010 0101B	25H
0110 0000B	60H

S = 0
Z = 0
P = 1
CY = 0
AC = 1

8085 programming model



Instruction:

An instruction is a command to the microprocessor to perform a given task on a specified data.

Each instruction has two parts:

- operation code (opcode)-the task to be performed
- operand (or data) -is the data to be operated on

The operand (or data) can be specified in various ways.

It may include 8-bit data, an internal register, a memory location.

Classification of Instruction:

8085 instructions are classified into three groups.

- 1 byte instruction
- 2 byte instruction
- 3 byte instruction

- 1 byte instruction –

  A 1-byte instruction includes the opcode and operand in the same byte.

  Example:

  MOV A,B

  Coded as 01111000 = 78H

- 2 byte instruction –

  In a two-byte instruction, the first byte specifies the opcode and the second byte specifies the operand.

  Example:

  MVI A, 30H

  Coded as 3EH 30H

- 3 byte instruction –

  In a three-byte instruction, the first byte specifies the opcode, and the following two bytes specify the 16-bit address.

  Example:

  JMP 2085H

  Coded as C3H 85H 20H

Operation:

microprocessor has 3 categories.

- Microprocessor initiated operations
- Internal operations
- Peripheral operations

There are 4 microprocessor initiated operations:

- Memory read
- Memory write
- I/O read
- I/O write

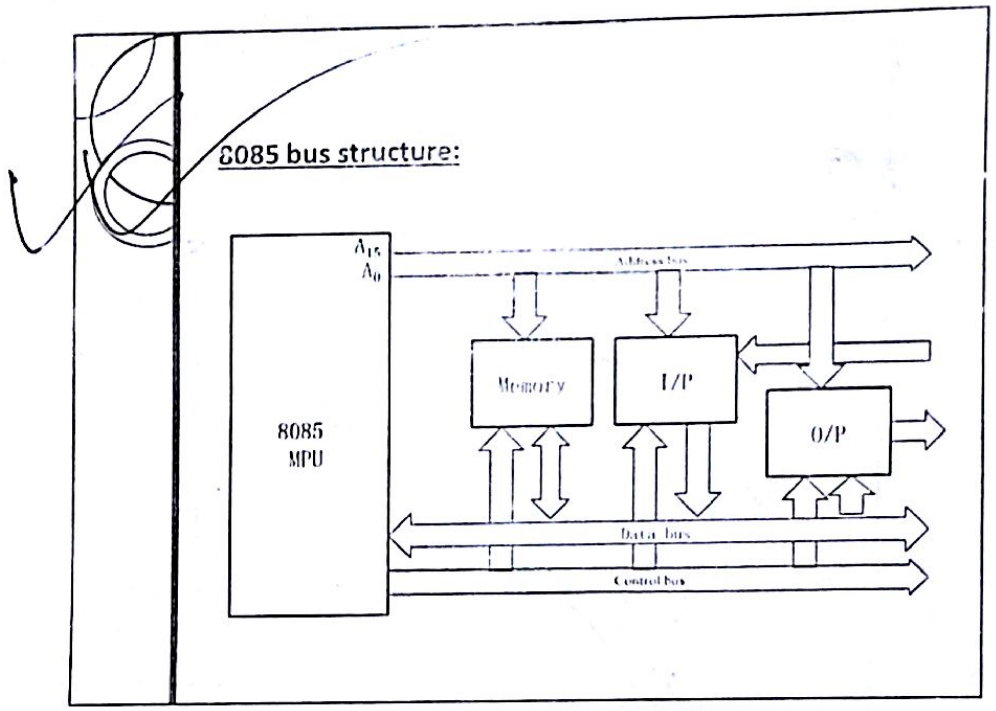
To communicate with a peripheral, microprocessor needs 3 steps:

- Identify the peripheral or memory location.
- Transfer binary information.
- Provide timing signals

Address:

In a computer system, each peripheral or memory location is identified by a binary number, called address.

8085 bus structure:



0 = 0000
1 = 0001
2 = 0010
3 = 0011
4 = 0100
5 = 0101
6 = 0110
7 = 0111
8 = 1000
9 = 1001

A = 1010
B = 1011
C = 1100
D = 1101
E = 1110
F = 1111

যদি 3B হয়,
3 = এমন 0011
B = 1011.

∴ 3B → 00111011

আর, 25 কে,
Binary te convert করলে,
00100101

A = 1010	D = 1101
B = 1011	E = 1110
C = 1100	F = 1111

Question

- How many locations can be addressed with a 32 bit address bus?

Computer Structures

3 Computer structures are :

1. General Register Machines
2. Accumulator based Machines
3. Stack Machines

Problem

- Consider the following C statement:

  D = A+B*C;

  Rewrite the statement using 3, 2, 1, 0 Address instruction set

Three-Address	Two-Address	One-Address	Zero-address
1. MUL B,C,D; D←(B)*(C) 2. ADD A,D,D; D←(A)+(D)	1. MOV B,D; D←(B) 2. MUL C,D; D←(C)*(D) 3. ADD A,D; D←(A)+(D)	1. LDA B; Acc←(B) 2. MUL C; Acc←(Acc)*C 3. ADD A; Acc←(Acc)+A 4. STA D; D←(Acc)	1. PUSH A; 2. PUSH B; 3. PUSH C; 4. MUL; 5. ADD; 6. POP D;

STACK MACHINE

- Two basic operations:
  - 1. PUSH (Writing into the Stack)
  - 2. POP (Reading from the Stack)
- SP register: holds the address of the most recently item entered into the stack i.e. TOS