1. Write an assembly language program to ADD register pairs BC and DE (with carry) and store the result to memory location 2000H.

SOLUTION:

The addition of the 16 bits numbers is performed in such a way that lower byte is added first i.e (addition of data of Registers C and E) and the higher byte i.e (data of Registers B and L) is added with carry.

|  |  |  |
| --- | --- | --- |
| Memory | Mnemonic | Comments |
| 4000 | MOV A, C | Transfers the content of Register C to Register A. |
| 4001 | ADD E | Add the contents of Register E to the accumulator |
| 4003 | STA 2000H | Stores the content of accumulator to the memory location whose address is specified by the last two bytes of the instruction |
| 4006 | MOV A, B | Transfers the content of Register B to Register A. |
| 4007 | ADC D | Add the contents of Register D to the accumulator with carry. |
| 4008 | STA 2001H | Stores the content of accumulator to the memory location (2001H) whose address is specified by the last two bytes of the instruction |
| 400B | HLT | Terminate the program |

If BC register pair has FFFFH and DE register pair has 0302H, then the result of execution of above program is the sum of Register pairs B and D.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CARRY | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **BC** |  | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| **DE** |  | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |
| TOTAL |  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

The lower byte result (01 H) is stored in memory location 2000H while higher byte result (03H) is stored in memory location 2000H.

1. Write an assembly language program to ADD n numbers stored in memory location starting from 9000H.

SOLUTION:

Assuming that there are five 8 bits numbers stored in memory location starting from 9000H.

|  |  |  |
| --- | --- | --- |
| Memory | Mnemonic | Comments |
| 4000 | MVI B, 04H | Loads the immediate data 04H to Register B, which is considered as counter. To add, five 8 bits numbers, initial counter is set at 04H. |
| 4002 | LXI H, 9000H | Loads the starting address of the data 9000H to HL register pairs. |
| 4005 | MOV A, M | Moves the first data from memory which address is specified by HL register pairs to the accumulator. |
| 4006 | INX H | Increment the HL register pairs by 1. |
| 4007 | ADC M | Add the data from memory which address is specified by HL register pairs to the accumulator with carry. |
| 4008 | DCR B | The counter value is decreased by 1. |
| 4009 | JNZ 4006H | Transfer the control of program to the address specified by the last two bytes of the instruction (PC changes to 4006 instead of 400C) until the result of operation is zero i.e. until the Register B has zero value by setting Zero flag. |
| 400C | HLT | Terminate the program |

The result is the sum of n numbers (5 numbers in above example) which is stored in accumulator. As shown below, five 8 bits data’s 01 -05 are stored in memory location 9000 to 9004 and the result is accumulated in accumulator.

 