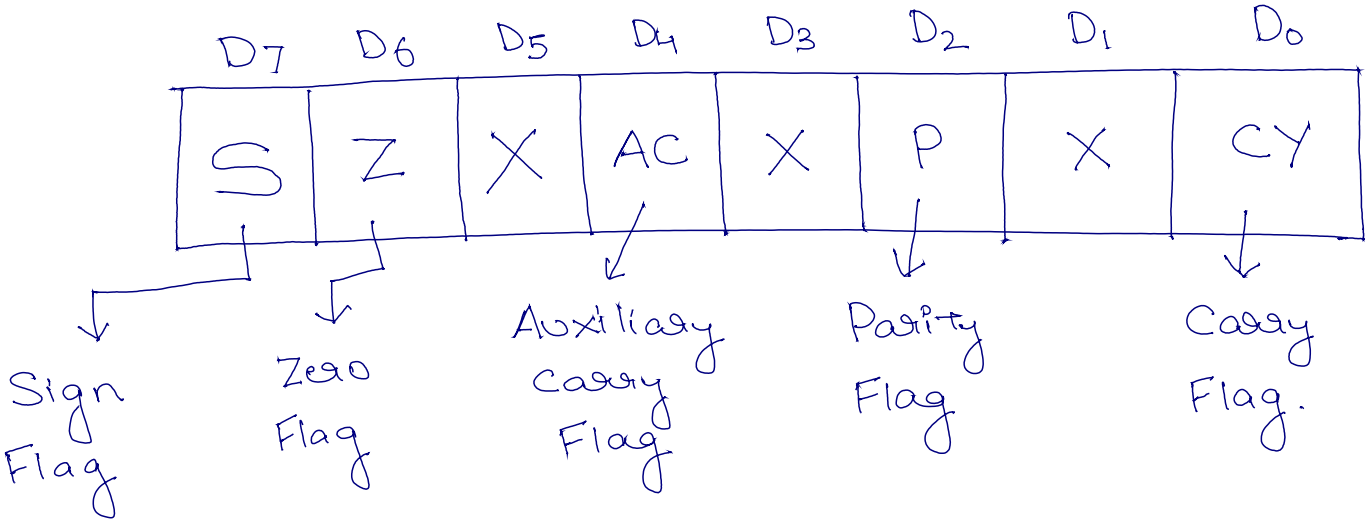
27/10/2021

MICROPROCESSOR

Q Discuss the Flag Register of 8085 µp.

Ans There are 5 Flags in 8085. They are organised in a 8-bit register as follows:



Bits marked with X mean no Flags are assigned for those bits.

Sign Flag :- After execution of some operation in ALU, if the result MSB (most Significant) is 1, it is interpreted as -ve value and hence Sign Flag is set (S=1).

For example: We are subtracting Two numbers.

$$\begin{array}{r} {}^{0}{}^{10}\quad {}^{0} \\ 01\not{X}\not{\emptyset} \quad 01\not{X}\not{\emptyset}^{10} \\ -\ 0001\ 0001 \\ \hline 0101\ 0001 \end{array}$$

Value of MSB becomes value of Sign Flag.

MSB

Result will goto accumulator

Zero Flag :- The Z flag is set if the result of some operation in ALU is zero and Similarly Z flag is reset if result is non-zero.

Z = 0 Z is reset ; Z = 1 Z is set.

For example : ① We are adding two numbers.

Since result is a non-zero value hence

Z = 0

```
  0110   0110
+ 0001   0001
-------------
  0111   0111  → result.
-------------
```

② We are subtracting two numbers.

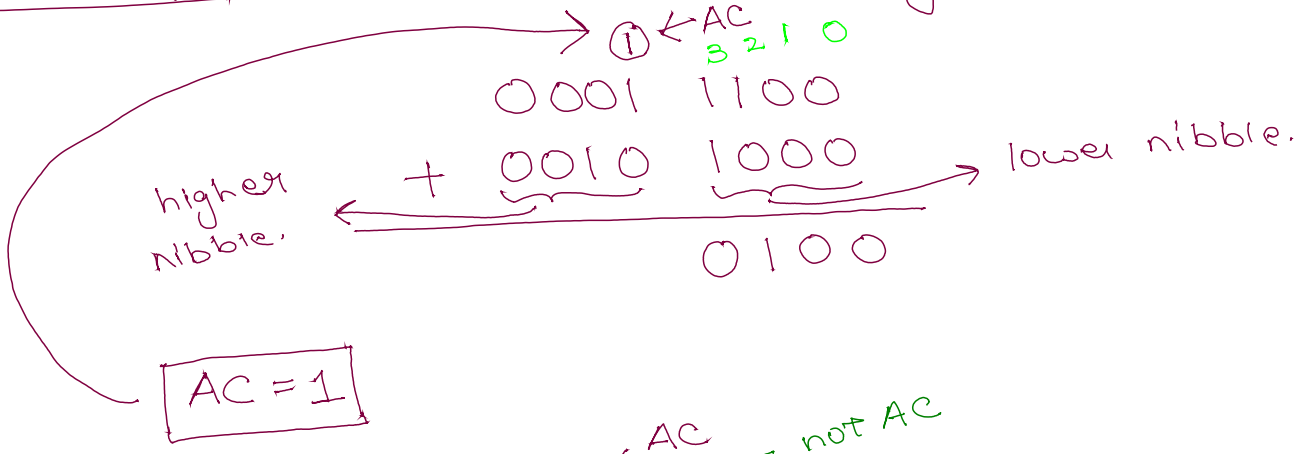
Since result is a zero value hence

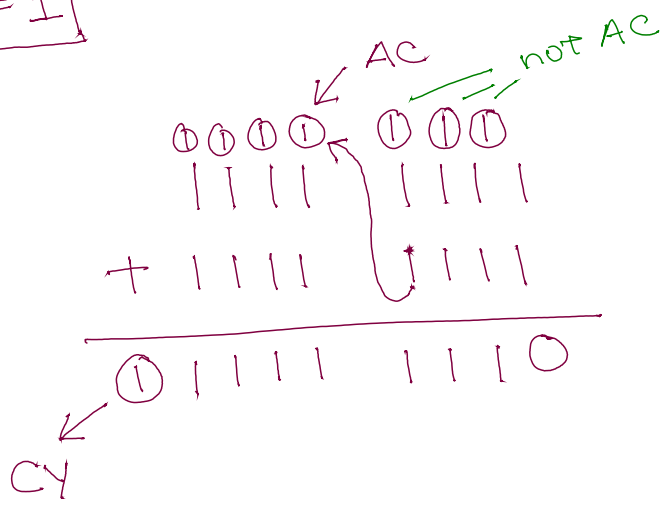
Z = 1

```
  0110   0110
- 0110   0110
-------------
  0000   0000  → result.
-------------
```

Auxiliary Carry Flag :- This Flag is set if there is an overflow out of bit 3, or if there is a carry from lower nibble to higher nibble then this flag becomes 1 else it remains zero.

For example : we are adding 2 numbers.





Parity Flag : Parity is defined by the number of ones present in the result (Contents of accumulator after ALU operation).

* If the result has even number of ones
  P = 1
* If the result has odd number of ones
  P = 0

For example :

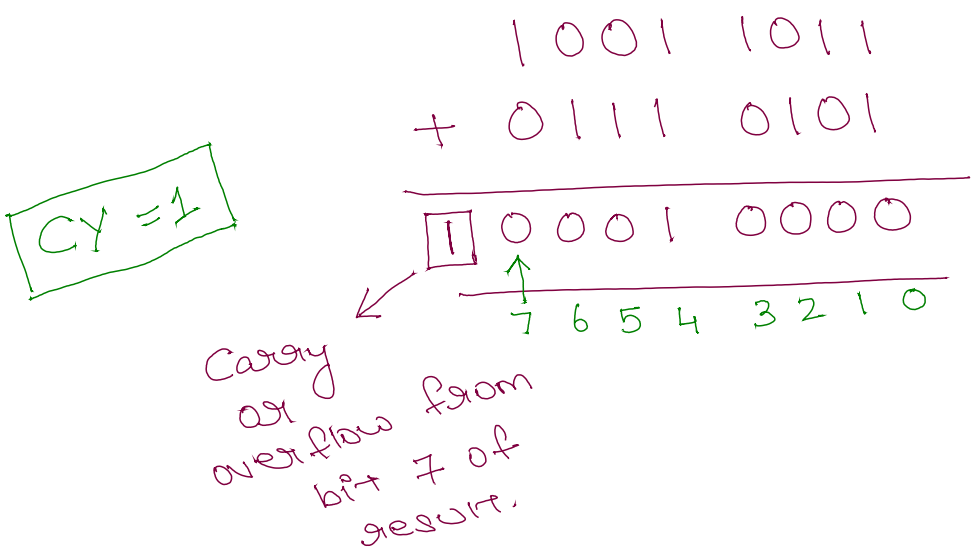
A 0110 0101

No. of 1's = 4 (even)

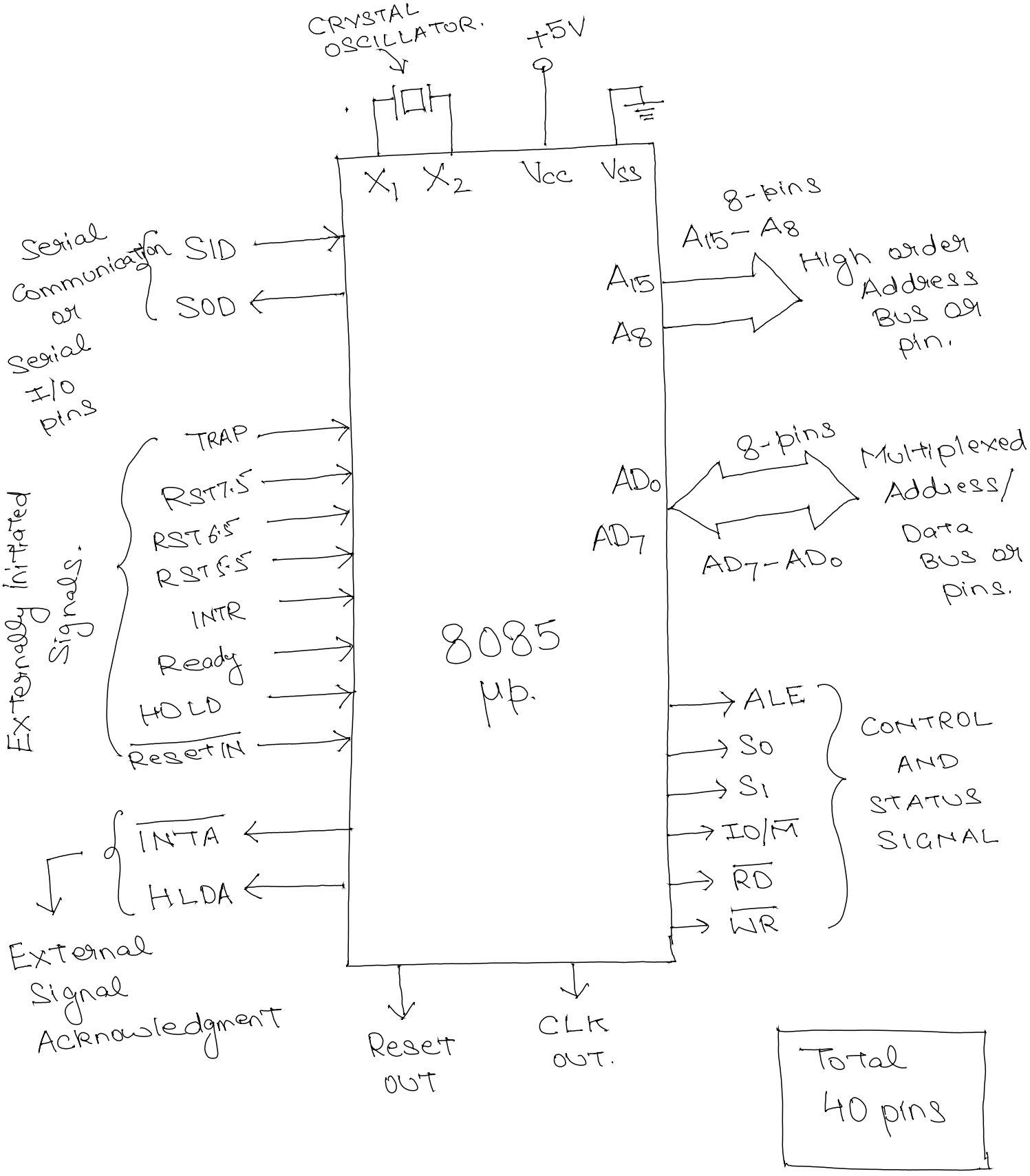
P = 1

Carry Flag : This Flag is set if there is overflow out of bit 7 (MSB) of the result after some ALU operation.

For example : We are adding two number.



Pin Description of 8085 µp

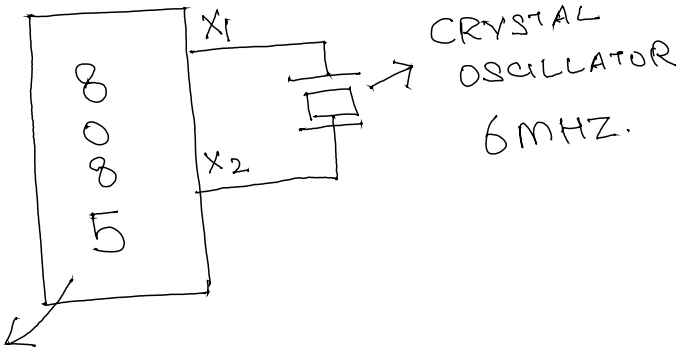


Power Supply Signals

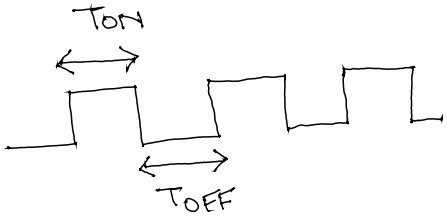
V_{CC} → Power pin, +5V input voltage

V_{SS} → Ground pin

X_1 and X_2 :- These pins are used for μp clock signal generation. A crystal oscillator of frequency 6 MHz is connected between X_1 and X_2. This will generated a clock signal of 3 MHz inside 8085 μp.



3 MHz Clock frequency will be generated in 8085 μp.

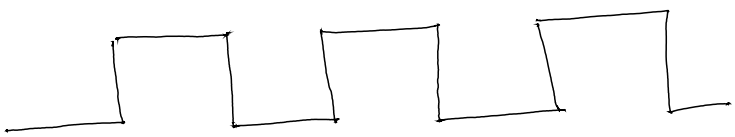


1 Clock period

$T = T_{ON} + T_{OFF}$

$f = \frac{1}{T}$

$f = \frac{1}{T_{ON} + T_{OFF}}$



Clock Signal.

1 Clock cycle.

$f = 3$ MHz.

$f = 3 \times 10^6$ Hz $\Rightarrow$ $T = \frac{1}{3 \times 10^6} = 0.33$ μsec.

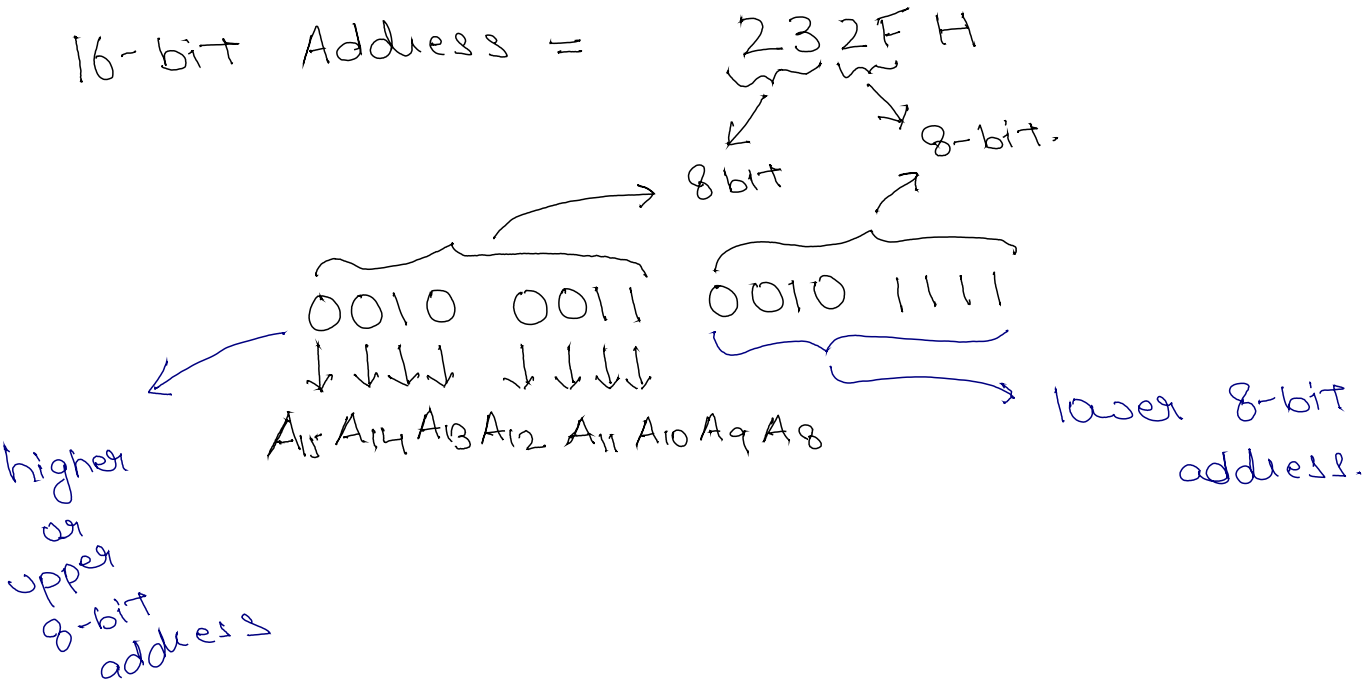
$= T_{ON} + T_{OFF}$

Address and Data Bus :-

$A_{15} - A_8$ → High order Address pin or Bus

$AD_7 - AD_0$ → Multiplexed Address/Data pins or Bus.

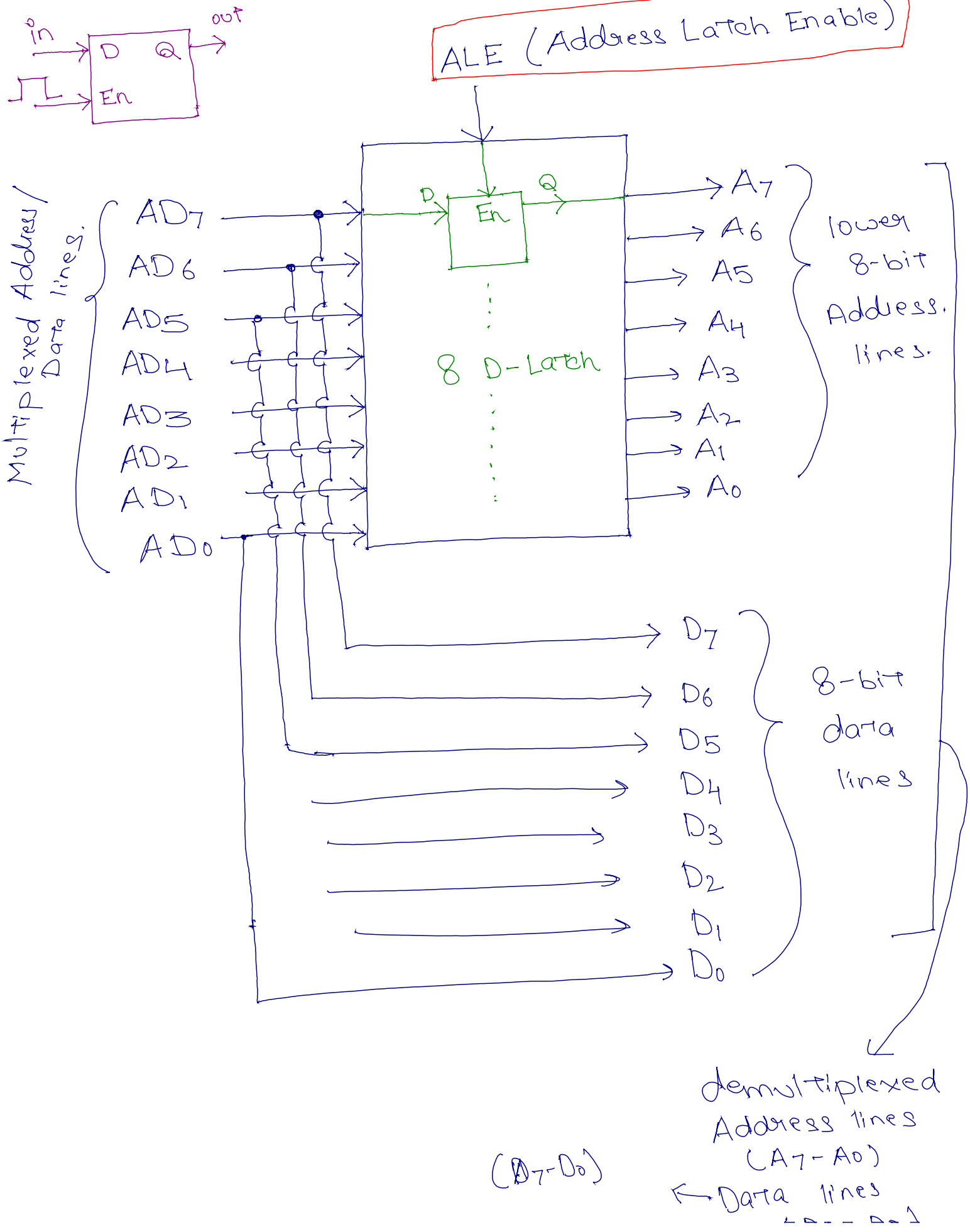
16-bit Address = 232F H

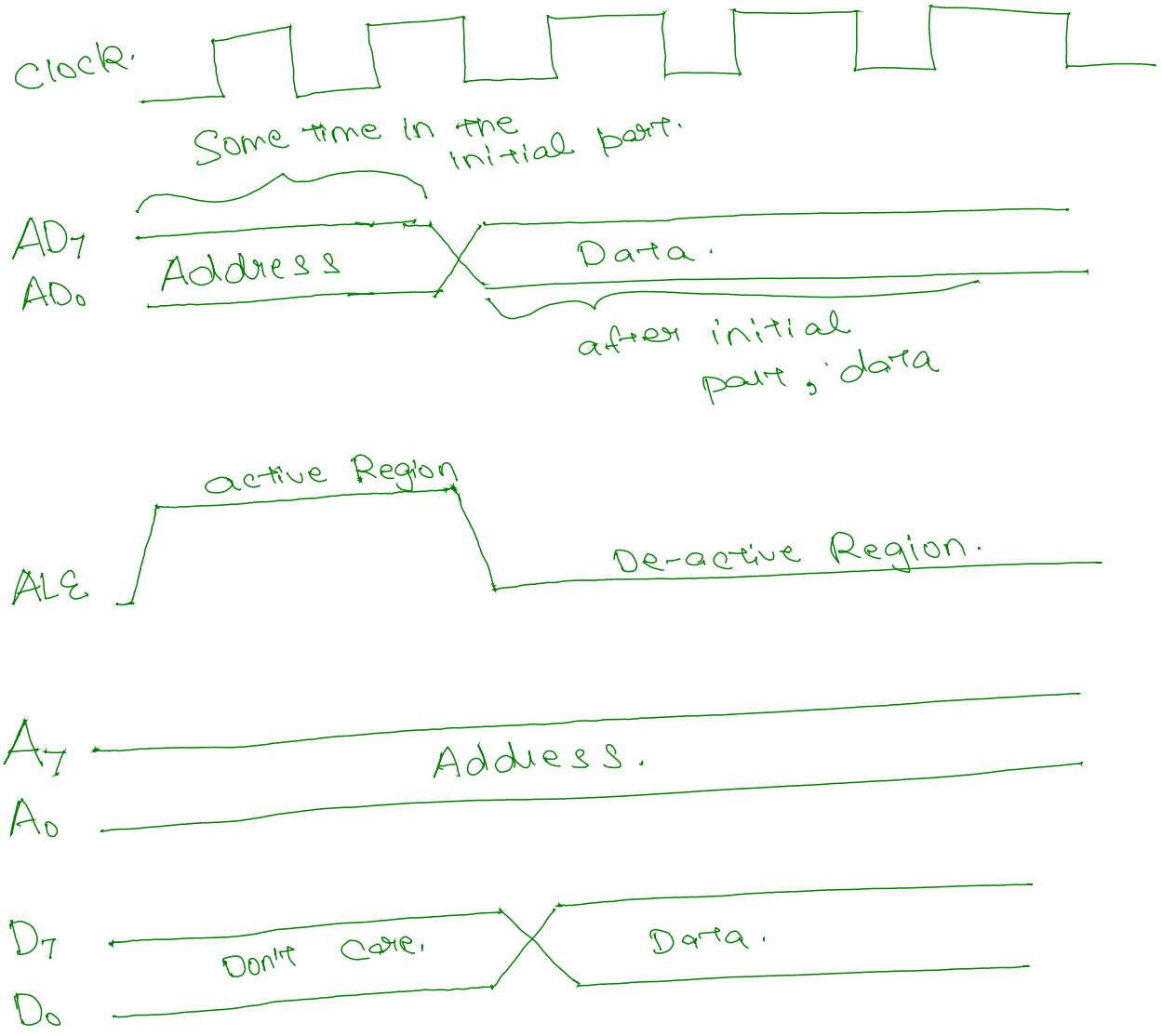


$A_{15} - A_8$: The higher or upper 8-bits of the 16 bit address is presented by these pins.

$AD_7 - AD_0$: They will hold lower 8-bits of 16-bit address during first or initial part of instruction, after that they will carry 8-bit data.

How Can we Demultiplexed the Address / Data lines ?





ALE (Address Latch Enable) :- ALE signal is used to demultiplex the Address/Data lines by enabling the D-latch. This signal is high during initial part of the instruction cycle. After that it remain in-active for the remaining part of instruction cycle. It automatically becomes high again during the initial part of next instruction cycle.

$IO/\overline{M}$: This pin indicates IO/ device operation or memory operation. When $IO/\overline{M} = 1$; mean µp is communicating with a IO Device and when $IO/\overline{M} = 0$ mean µp is communicating with memory.

$\overline{RD}$: Active low read signal. when $\overline{RD} = 0$ means µp wants to read data from memory or I/O device. Otherwise $\overline{RD} = 1$ always.

$\overline{WR}$: Active low write signal. when $\overline{WR} = 0$ means µp wants to write data to memory or IO device. Otherwise $\overline{WR} = 1$, always.

SID : Serial Input Data pin

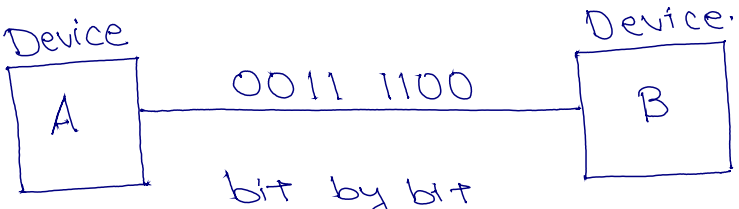
This pin accept serial data bits from external device.

SOD : Serial Output Data pin.

This pin will send serial data bits to some external device.

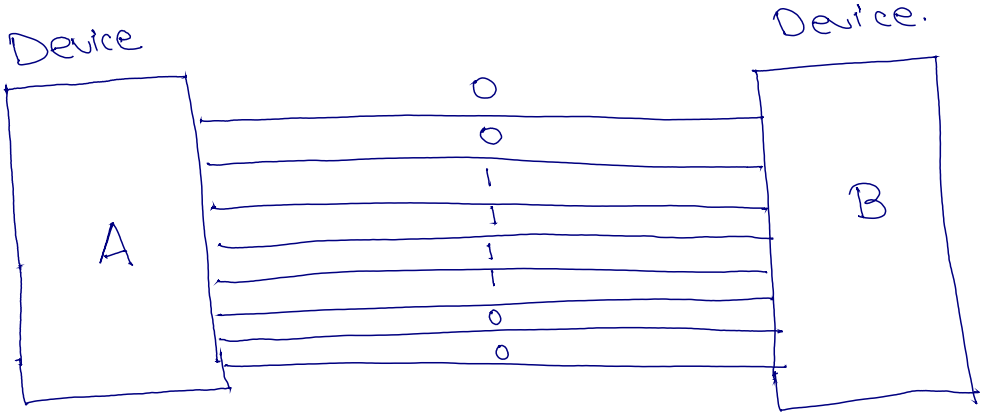
Q. What is the difference between Serial data Communication and parallel data Communication?.

Ans :



SERIAL COMMUNICATION

bit by bit data will be transmitted using single data line.



PARALLEL COMMUNICATION

each bit will be transmitted using dedicated lines (multiple data line)