

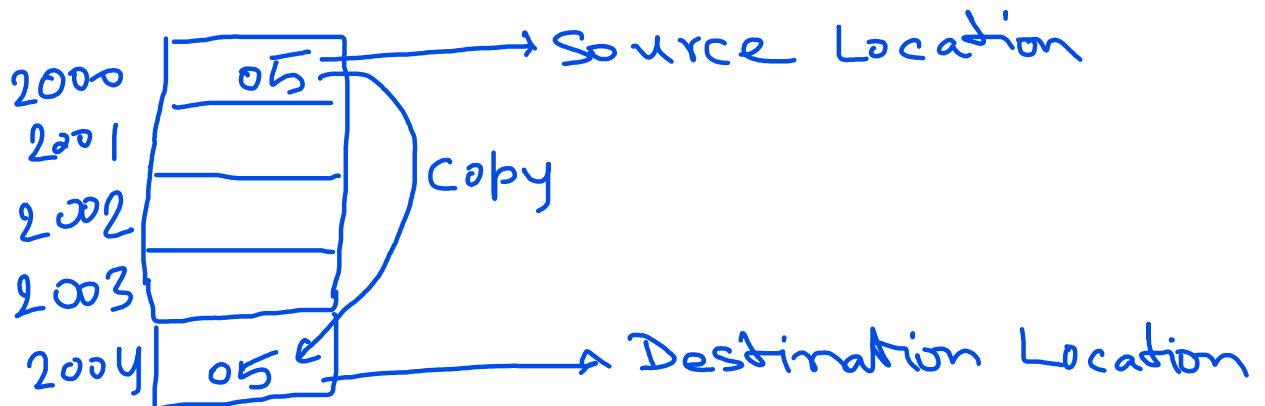
INSTRUCTION CLASSIFICATION:- ✓

- A instruction is a binary pattern designed inside a microprocessor to perform a specific function.
- entire group of instruction is instruction set.

Instruction set

- Data transfer (copy) instruction
- Arithmetic operations
- Logical operations
- Branching operations
- Machine control operations

Data transfer operations



Copy the content of source memory location to destination memory location

types of data transfer instruction

Types

- Between Registers
- Specific data byte to a register or a memory location

Example

copy the content of Register B to D

$B \leftarrow 05H$

$2000H \leftarrow 05H$

Load a 05H to register B on in the 2000H

- Between memory Location and a register

From 2000H to B

- Between I/O Device and accumulator

From Input Keyboard to accumulator.

Arithmetic operations

These instructions perform —

- Addition
- Subtraction
- Increment / Decrement operations

Addition —

- any 8 bit numbers, or content of register or a content of memory can be add with accumulator and result stores in the accumulator.

Ex $A \leftarrow 00H$
 $B \leftarrow 25H$

$$A = A + B$$
$$00 + 25 = 25H$$

$$A = 25H$$

- No two register can add their content
- Only DAD instruction allow 16 bit addition of two register.

Subtraction -

- any 8 bit numbers, or content of registers can be subtracted with the help of Accumulator content and result store in the accumulator.
- Subtractions perform 2's complement and result; if negative perform 2's complement.
- No two register allowed to subtract their content directly.

$$\begin{array}{r} \curvearrowright 16+8=24 \\ 678 \quad -13 \\ -50- \\ \hline 13 \end{array}$$

A	B	C	D	E	F
10	11	12	13	14	15

$$\begin{array}{r} 78H = 120 \\ - 50H = 93 \\ \hline 27 = 13H \end{array}$$

$$\begin{array}{r} 16+11 \\ 13H \\ \hline \hline \end{array}$$

$$\begin{array}{r} CFH \\ -23H \\ \hline (ACH) \end{array}$$

-ve of ACH is result

$$\begin{array}{r} 23H = (35)_{10} \\ - CFH = (207)_{10} \\ \hline 54H - (172)_{10} \end{array}$$

$$(172)_{10} = (AC)_{16}$$

$$\begin{array}{cc} (A)_{16} & (C)_{16} \\ \swarrow & \searrow \\ (10)_{10} & (12)_{10} \\ | & | \end{array}$$

$$\begin{array}{r}
 \downarrow \qquad \qquad \downarrow \\
 1010 \qquad \qquad 1100 \\
 \\
 0101 \qquad \qquad 0011 \rightarrow 1's \\
 \qquad \qquad \qquad + \qquad \qquad 1 \\
 \hline
 0101 \qquad \qquad 0100 \qquad = \underline{\underline{54H}} \\
 \underline{\quad} \qquad \qquad \underline{\quad} \\
 5 \qquad \qquad \qquad 4
 \end{array}$$

Increment/Decrement $\rightarrow$

8 bit content of a register can be incremented / Decrement by 1

Similarly 16 bit content of a register pair (like BC, HL --) can be incremented / Decrement by 1.

Logical operations —

These instructions performed various operations with content of accumulator.

— AND, OR, XOR operations

Any 8 bit number, content of register or content of a memory location

can be logically AND, OR or XOR ed with content of accumulator and result stored in Accumulator.

Ex

$$\begin{array}{r} 1010 \\ 1101 \\ \hline 1000 \end{array}$$

AND if 0 found result become 0 otherwise 1

$$\begin{array}{r} 1010 \\ 1101 \\ \hline 1111 \end{array}$$

OR if 1 found in a column result become 1 otherwise 0

$$\begin{array}{r} 1010 \\ 1101 \\ \hline 0111 \end{array}$$

XOR if both bit are 0 or 1 in a column result become 0 otherwise 1

- Rotate - each bit of accumulator can be shifted by 1 bit either left or Right to the next position.

- Compare - any 8-bit number, content of registers or memory can be compared with accumulator content -

- Complement - Accumulator content can be complemented