24EC501- Microprocessor , Microcontroller and Interfacing Techniques

Addressing Modes of 8086

Addressing mode specifies the way an operand (data) is accessed for an instruction in assembly language programming. It tells the CPU where the operand is located — in a register, memory, or given directly in the instruction.
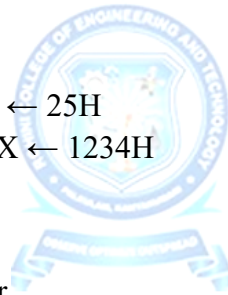
The **8086** supports the following **addressing modes**:

1. Immediate Addressing Mode

- Operand is given directly in the instruction**.**
- Fastest method because data is already available.

Example:

MOV AL, 25H   ; AL ← 25H
MOV BX, 1234H ; BX ← 1234H

2. Register Addressing Mode

- Operand is stored in a register**.**
- The instruction specifies the register name.

Example:

MOV AX, BX ; AX ← BX
ADD DL, CL ; DL ← DL + CL

3. Direct Memory Addressing Mode

- The offset address (within a segment) of the operand is given directly in the instruction.

Example:

MOV AL, [5000H] ; AL ← contents of memory at DS:5000H
MOV [6000H], DL ; Store DL at DS:6000H

4. Register Indirect Addressing Mode

- Memory address of operand is held in a register (BX, SI, DI, BP).
- Physical address is computed using the register and DS or SS segment.

Example:

MOV AL, [BX] ; AL ← contents at DS:[BX]

MOV [SI], DL ; Store DL at DS:[SI]

5. Indexed Addressing Mode

- Offset address = Index Register (SI/DI) + Displacement.

  MOV AL, [SI+200H] ; AL ← contents at DS:(SI+200H)
  MOV DL, [DI+1050H]

6. Based Addressing Mode

- Offset address = Base Register (BX/BP) + Displacement.

  Example:

  MOV AL, [BX+300H] ; AL ← DS:(BX+300H)
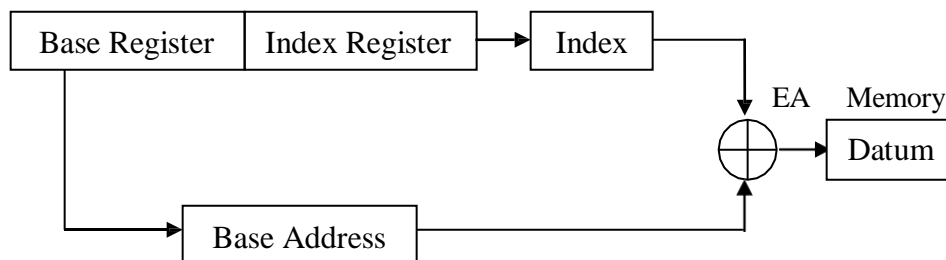 MOV DL, [BP+500H] ; DL ← SS:(BP+500H)

7. Based Indexed Addressing Mode

- Offset address = Base Register + Index Register.

  Example:

  MOV AL, [BX+SI] ; AL ← DS:(BX+SI)
  MOV DL, [BP+DI] ; DL ← SS:(BP+DI)

8. Based Indexed with Displacement

- Offset address = Base Register + Index Register + Displacement.

  Example:

  MOV AL, [BX+SI+200H]
  MOV DL, [BP+DI+1000H]

Base Register	Index Register	Displacement

Index

EA   Memory

Base Address

Datum