Al-Mustaqbal University

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Department of Medical Instrumentation Techniques Engineering

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Subject: **Instruction sets & addressing modes .**

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.

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Branch Group Instructions in 8086

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Branch instructions in the **8086 microprocessor** allow changing the sequence of program execution. These instructions are categorized into three types:

1. **Jump Instructions**
2. **Call Instructions**
3. **Return Instructions**

Branching instructions alter the normal sequential flow, either **unconditionally** or **conditionally**

Jump Instruction Table:

Instruction	Description	Condition for Jump
JMP	Unconditional jump to address	Always jumps
JC	Jump if carry flag is set	CF = 1
JNC	Jump if carry flag is not set	CF = 0
JZ	Jump if zero flag is set	ZF = 1
JNZ	Jump if zero flag is not set	ZF = 0
JP	Jump if sign flag is positive	SF = 0
JM	Jump if sign flag is negative	SF = 1
JPE	Jump if parity flag is even	PF = 1
JPO	Jump if parity flag is odd	PF = 0

1. Jump Instructions

Unconditional Jump:

JMP operand (three-byte instruction)
Transfers program execution to the address given in the operand.

Example:
`JMP 2300H`
Transfers program execution to address 2300H.

Conditional Jumps:

Transfers control to the specified address based on the status of certain flags.

1. **JC operand** (Jump if Carry)
   - Jumps to the address if **CF (Carry Flag) = 1**.
   - `JC 2300H` (*Jump to 2300H if CF=1*).
2. **JNC operand** (Jump if No Carry)
   - Jumps to the address if **CF = 0**.
   - `JNC 2300H` (*Jump to 2300H if CF=0*).
3. **JZ operand** (Jump if Zero)
   - Jumps to the address if **ZF (Zero Flag) = 1**.
   - `JZ 2300H` (*Jump to 2300H if ZF=1*).
4. **JNZ operand** (Jump if Not Zero)
   - Jumps to the address if **ZF = 0**.
   - `JNZ 2300H` (*Jump to 2300H if ZF=0*).
5. **JP operand** (Jump if Positive)
   - Jumps to the address if **SF (Sign Flag) = 0**.
   - `JP 2300H` (*Jump to 2300H if SF=0*).
6. **JM operand** (Jump if Minus)
   - Jumps to the address if **SF = 1**.
   - `JM 2300H` (*Jump to 2300H if SF=1*).
7. **JPE operand** (Jump if Parity Even)
   - Jumps to the address if **PF (Parity Flag) = 1**.
   - `JPE 2300H` (*Jump to 2300H if PF=1*).
8. **JPO operand** (Jump if Parity Odd)
   - Jumps to the address if **PF = 0**.
   - `JPO 2300H` (*Jump to 2300H if PF=0*).

Examples

1. Display Numbers from 0 to 9 using 7-Segment Display

```
MOV AL, 3FH
OUT 03H
MOV AL, 06H
OUT 03H
MOV AL, 5BH
OUT 03H
MOV AL, 4FH
OUT 03H
MOV AL, 66H
OUT 03H
MOV AL, 6DH
OUT 03H
MOV AL, 7DH
OUT 03H
MOV AL, 07H
```

OUT 03H

MOV AL, 7FH

OUT 03H

MOV AL, 6FH

OUT 03H

JMP START

2. Multiplication of 20 by 5 and Storing the Result in Register DX

MOV CX, 05H

MOV AX, 20H

MOV DX, 00H

LOOP: ADD DX, AX

LOOP LOOP

3. Sum Numbers from Memory [1000H] to [100CH] and Store at [100DH]

MOV AX, 0000H

MOV SI, 1000H

MOV CX, 0CH

START: ADD AX, [SI]

INC SI

LOOP START

MOV [100DH], AX

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