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CHAPTER # 5

Instruction set of 8086/88

COURSE OUTLINE QUESTIONS

Q_{no1} Define and explain the format of Move instruction?

MOV instruction is the most important command in the 8086 because it moves data from one location to another. It also has the widest variety of parameters, so the assembler programmer can use MOV effectively. FORMAT: MOV destination, source

Q_{no2}: Define and explain Push/ POP instruction?

Push instruction

The push instruction pushes a value onto the stack. The value is put ON TOP of the stack. The stack's size will increase by one.

Pop instruction

The pop instruction takes the TOP VALUE from the stack and assigns it to the specified variable. The stack's size will decrease by one. If there are no values on the stack (e.g. the stack 's size is equal to zero), then the error flag will be set.

Q_{no3} Define and explain Load effective address LEA?

LEA loads a pointer to the item you're addressing the purpose of LEA is to allow one to perform a non-trivial address calculation and store the result [for later usage]. Load Effective Address loads the specified register with the offset of a memory location.

Qno4 Define and explain String data transfer?

There are five string data transfer instructions: LODS, STOS, MOVS, INS, and OUTS. String instruction allows data transfers that are either a single byte, word, or double word (or if repeated, a block of bytes, words, or double words).

There are three types of instructions in LODS.

The LODS instruction loads AL, AX, or EAX with data stored at the data segment offset address indexed by the SI register.

In LODSB AL or AH is loaded with a byte. The contents of SI are incremented or decremented by 1 in LODSB

In LODSW AX with a word. The contents of SI are incremented or decremented by 2 in LODSW

In LODSD EAX is Loaded with a double word, the contents of SI is incremented or decremented by 4 in LODSD.

Qno5 Define and explain Arithmetic Group?

Arithmetic instructions perform several basic operations such as addition, subtraction, division, multiplication etc. After execution, the result is stored in the first operand.

Addition

The contents of the register or memory are added to the contents of the accumulator and the result is stored in the accumulator.

Example ADD AL,BL

Subtraction

The contents of the register or the memory are subtracted from the contents of the accumulator, and the result is stored in the accumulator.

Example SUB CL,BL

Comparison

The comparison instruction (CMP) is a subtraction that changes only the flag bits; the destination operand never changes. A comparison is useful for checking the entire contents of a register or a memory location against another value.

Example CMP CL,BL

Multiplication

Multiplication is performed on bytes, words, or doublewords, and can be signed integer (IMUL) or unsigned integer (MUL). The product after a multiplication is always a double-width product. If two 8-bit numbers are multiplied, they generate a 16-bit product

Example MUL CL

Division

As with multiplication, division occurs on 8- or 16-bit numbers in the 8086–80286 microprocessors, and on 32-bit numbers in the 80386 and above microprocessor. These numbers are signed (IDIV) or unsigned (DIV) integers. The dividend is always a double-width dividend that is divided by the operand.

Example DIV CL

Q_{no6} Describe BCD and ASCII arithmetic's?

ASCII arithmetic's

The ASCII arithmetic instruction function with ASCII-coded numbers. These numbers range in value from 30H to 39H for the numbers 0 to 9. There are four instructions used with ASCII arithmetic operations:

AAA (ASCII Adjust after Addition)

AAD (ASCII Adjust before Division)

AAM (ASCII Adjust after Multiplication)

AAS (ASCII Adjust after Subtraction)

BCD

Binary-coded decimal (BCD) numbers use 4 binary bits to represent each decimal digit. There are two types of BCD representation: unpacked BCD and packed BCD. In unpacked BCD representation, each digit is stored in a byte, while two digits are packed into a byte in the packed representation.

Q_{no7} Define and explain Arithmetic Group Logical Group?

Logic instructions perform logic operations upon corresponding bits of two registers. After execution, the result is stored in the first operand.

AND

Used for adding each bit in a byte/word with the corresponding bit in another byte/word.

NOT and NEG

These are two of a few instructions that contain only one operand. As with most other instructions, NOT and NEG can use any addressing mode except segment register addressing.

OR

Used to multiply each bit in a byte/word with the corresponding bit in another byte/word.

TEST

Used to add operands to update flags, without affecting operands.

Q_{no8} Define and explain Arithmetic Group Shift and Rotate instructions?

Shift and rotate instructions manipulate binary numbers at the binary bit level, as did the AND, OR, Exclusive-OR, and NOT instructions. Shifts and rotates find their most common applications in low-level software used to control I/O devices.

Shift

Shift instructions position or move numbers to the left or right within a register or memory location. They also perform simple arithmetic such as multiplication by powers of (left shift) and division by powers of (right shift).

Rotate

Rotate instructions position binary data by rotating the information in a register or memory location, either from one end to another or through the carry flag.

Q_{no9} Define and explain Arithmetic Group Programming control instructions?

The program control instructions direct the flow of a program and allow the flow to change. A change in flow often occurs after a decision made with the CMP or TEST instruction is followed by a conditional jump instruction.

JUMP (Conditional and Unconditional)

The jump instructions allow the programmer to (indirectly) set the value of the EIP register. There are two types of jump instructions conditional and unconditional jumps

Conditional Jump Instruction

A conditional jump instruction branches to a label when specific register or flag conditions are met

Examples:

JB, JC jump to a label if the Carry flag is set

JE, JZ jump to a label if the Zero flag is set

JS jumps to a label if the Sign flag is set

Unconditional jumps instruction

JMP: - (unconditionally jump) the program sequence is transferred to the memory location specified by the 16-bit address given in the operand.

While loop

Checks condition for truthfulness before executing any of the code in the loop. If condition is initially false, the code inside the loop will never be executed.

Do-While loop

Checks condition for truthfulness after executing the code in the loop. Therefore, the code inside the loop will always be executed at least once

Q_{no10} Define and explain Arithmetic Group Procedure?

The procedure (subroutine, method, or function) is an important part of any computer system's architecture. A procedure is a group of instructions that usually performs one task. A procedure is a reusable section of the software that is stored in memory once, but used as often as necessary.

Call instruction

The CALL instruction interrupts the flow of a program by passing control to an internal or external subroutine. An internal subroutine is part of the calling program. An external subroutine is another program.

Return

The RET instruction returns control from a subroutine back to the calling program and optionally returns a value.

Best Of Luck