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Riphah International University

Lab:02

Coal

**Name:** Ayesha Tayyaba

**Sap ID:** 56546

**Department:** CS

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**Questions:**

**Questions: 01**

1. Describe the function of each:

* Accumulator Register (A, AX, EAX, RAX)
* Base Register (B, BX, EBX, RBX)
* Count Register (C, CX, ECX, RCX)
* Data Register (D, DX, EDX, RDX)

**Answer:**

**Accumulator Register:**

The **Accumulator Register** is primarily used for arithmetic and logical operations. Process take input from the register and after processing result are given back to the register.

**Accumulator Registers (A, AX, EAX, RAX)**

The **Accumulator Register** has expanded over time to support growing computational needs. Each version extends the capabilities of the previous one, adapting to larger data sizes and improved processor architectures.

**1. A (Accumulator Register) – 8-bit**

* One of the earliest registers used in early processors.
* Stored small data for arithmetic and logic operations.
* Used in **8-bit processors**.

**2. AX (Accumulator Register) – 16-bit**

* Introduced in **16-bit processors**.
* Divided into **AH (high byte)** and **AL (low byte)**.

**3. EAX (Extended Accumulator Register) – 32-bit**

* Found in **32-bit processors**.
* The **"E" in EAX** stands for **Extended**.
* Used in **faster computations**, memory addressing, and larger data processing.

**4. RAX (Register Accumulator) – 64-bit**

* Used in **modern 64-bit processors**.
* Supports larger **64-bit** data operations for high-performance computing.

Base Register:

The **Base Register** helps in storing memory addresses, making it useful for accessing data stored in memory. It is used in pointer-based operations and use for data access.

**Versions**:

* BX (16-bit)
* EBX (32-bit)
* RBX (64-bit)

Count Register:

The **Count Register** is used for counting and looping in the program.

When we want to do repeatedly any program then we use Count Register.

**Size Variations**:

* CX (16-bit)
* ECX (32-bit)
* RCX (64-bit)

**Data Register:**

The **Data Register** is used for holding data for output.

D (**Data Register**) – 8-bit

**Size Variations**:

* DX (16-bit)
* EDX (32-bit)
* RDX (64-bit)

**Question: 02**

1. Briefly describe the functions of these bits:

* Overflow Flag (OF)
* Zero Flag (ZF)
* Carry Flag (CF)

**Answer:**

**Functions of Important Flags**

Flags are small indicators in the CPU that show the result of an operation. Here’s what these three flags do:

**1. Overflow Flag (OF)**

* **Turns ON (1) when a number is too big to fit in the register.**
* Happens mostly in **signed (positive/negative) number calculations**.
* Example: If adding two big positive numbers gives a negative result, **OF is set**.

**2. Zero Flag (ZF)**

* **Turns ON (1) if the result of an operation is zero.**
* Used to check if two numbers are equal or if a loop should stop.
* Example: If 5 - 5 = 0, then **ZF is set**.

**3. Carry Flag (CF)**

* **Turns ON (1) when a number is too big for an unsigned calculation.**
* Used in **addition (carry) and subtraction (borrow)**.
* Example: In 8-bit, 255 + 1 gives 256, which doesn’t fit, so **CF is set**.

**Question: 03**

1. Write a simple program using MOV, ADD, and SUB instructions:

* Move values to registers
* Perform addition and subtraction
* Store and display results

**Answer:**

. MODEL SMALL

. STACK 100H

.DATA

result DB? ; Variable to store the result

. CODE

MAIN PROC

MOV AX, 5 ; Move 5 into AX

MOV BX, 3 ; Move 3 into BX

ADD AX, BX ; AX = AX + BX (5 + 3 = 8)

MOV result, AL ; Store result in memory

SUB AX, 2 ; AX = AX - 2 (8 - 2 = 6)

MOV result, AL; Store updated result

MOV AH, 4CH ; Exit program

INT 21H ; DOS interrupt

MAIN ENDP

END MAIN