# Chapter-2

# Microprocessor Architecture and Microcomputer System

## Microprocessor

❏ A microprocessor is a programmable logic device, designed with registers, flip-flops, and timing elements. It is a single chip made by LSI or VLSI technology. Microprocessor is also called as a brain of a computer system. It is the CPU of a microcomputer.

## Microprocessor Unit (MPU)

❏In early processors the different units of a CPU are made not in a single chip rather in different separate chips.These group of chips are called a Micro Processor Unit (MPU).

## 2.1 MICROPROCESSOR ARCHITECTURE AND ITS OPERATIONS

**Architecture of Microprocessor**

❑ The internal logic diagram of a microprocessor is called its architecture.

**Different Categories of Functions Performed by a Microprocessor**

All the various functions performed by the microprocessor can be classified in three categories:

❑ Microprocessor-initiated operations.
❑ Internal data operations.
❑ Peripheral (or externally) initiated operations.

## 2.1.1 Microprocessor-Initiated Operations

The MPU performs primarily four operations:

❑ Memory Read: Reads data from memory.
❑ Memory Write: Writes data into memory.
❑ I/O Read: Accepts data from input devices.
❑ I/O Write: Sends data to output devices.

## Steps to Communicate with Peripherals or Memory Location

To communicate with a peripheral or a memory location, the MPU needs to perform the following steps:
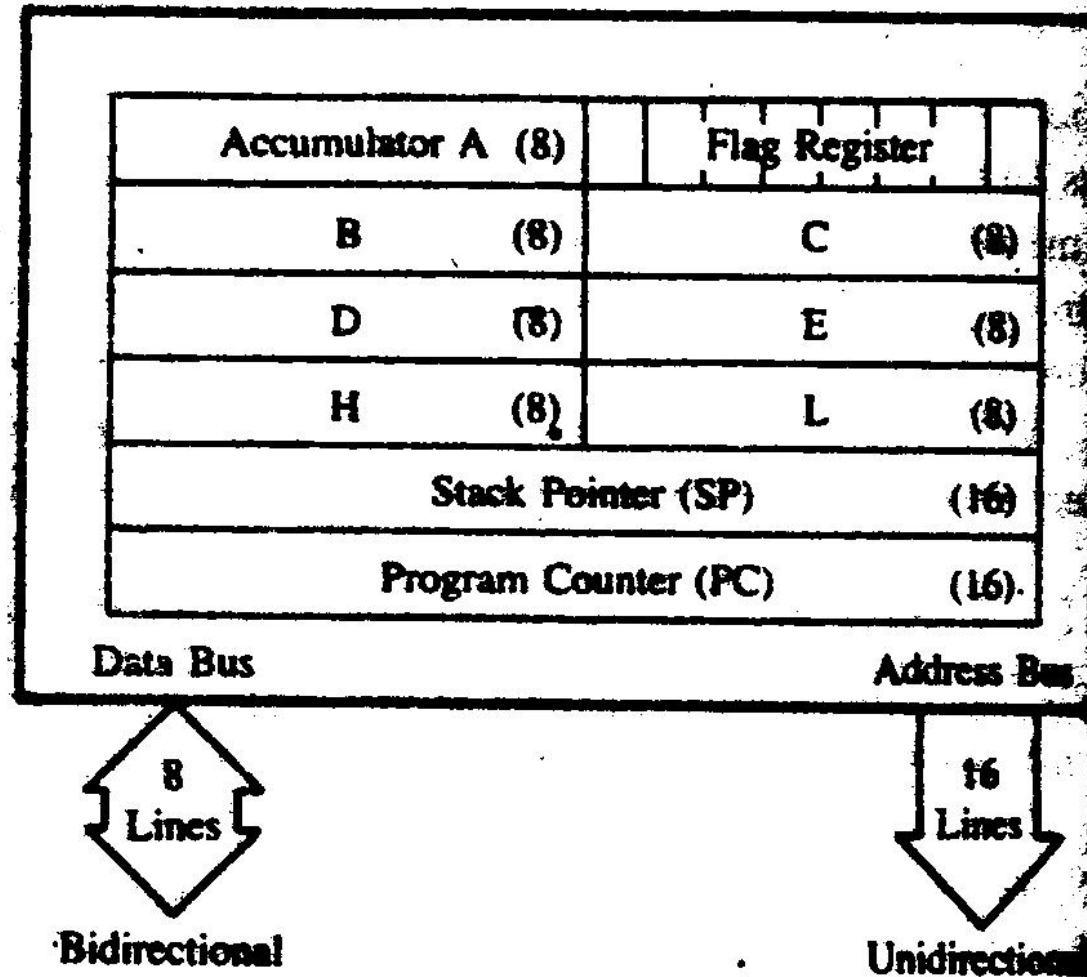
❑ Step 1: Identify the peripheral or the memory location (with its address)
❑ Step 2: Transfer data.
❑ Step 3: Provide timing or synchronization signals.

## 2.1.2 Internal Data Operations and the 8085/8080A Registers

The internal architecture of the 8085/8080A microprocessor determines how and what operations can be performed with data. These operations are:
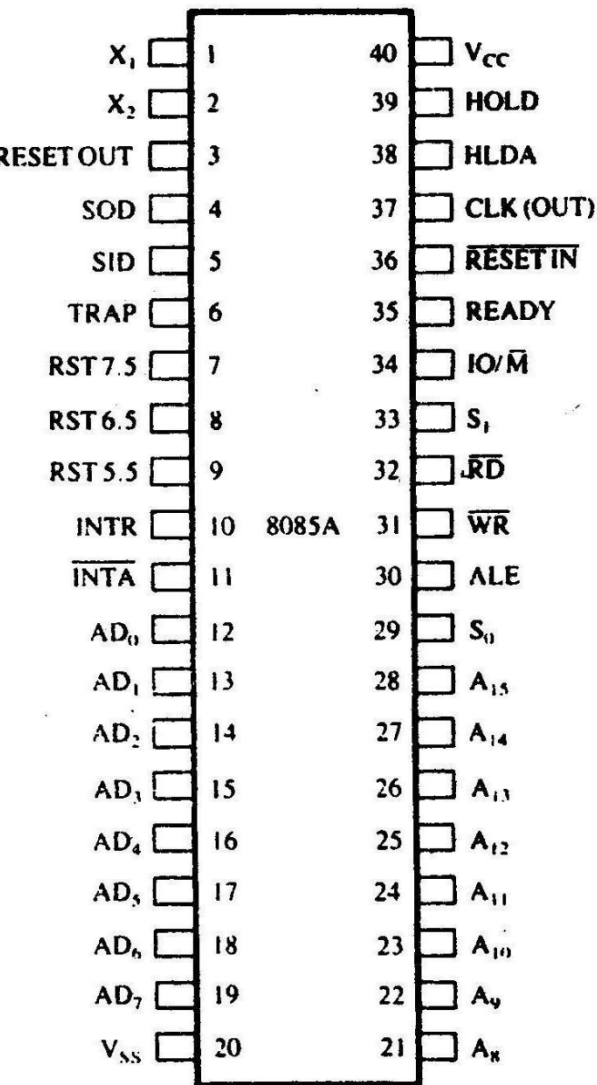
- ❑ Store 8-bit data
- ❑ Perform arithmetic and logical operations.
- ❑ Test for conditions.
- ❑ Sequence the execution of instructions.
- ❑ Store data temporarily during execution in the defined R/W memory locations called the stack.

# FIGURE 2.3
## The 8085 Programmable Registers

| Accumulator A (8) | | Flag Register | |
|---|---|---|---|
| B (8) | | C | (8) |
| D (8) | | E | (8) |
| H (8) | | L | (8) |
| Stack Pointer (SP) | | | (16) |
| Program Counter (PC) | | | (16) |

Data Bus

Address Bus

8 Lines

16 Lines

Bidirectional

Unidirection

## 2.1.3 Peripheral or Externally Initiated Operations

External devices (or signals) can initiate the following operations for which individual pins on the microprocessor chip are assigned:

❑ **Reset:** When all internal operations are suspended and the program counter(PC) is cleared (0000H).

❑ **Interrupt:** Microprocessor can be interrupted from the normal execution and asked to execute some other instructions called service routine. After completing service routine it resumes its operation.

❑ **Ready:** If the signal of 8085/8080A READY pin is low, the microprocessor enters into a Wait state. The pin is used to synchronize with slower peripherals with microprocessor.

❑ **Hold:** When the HOLD is activated by an external signal, the microprocessor give up control of system bus for external peripheral to use them. For example, HOLD signal is used in DMA data transfer.

8085 Pinout