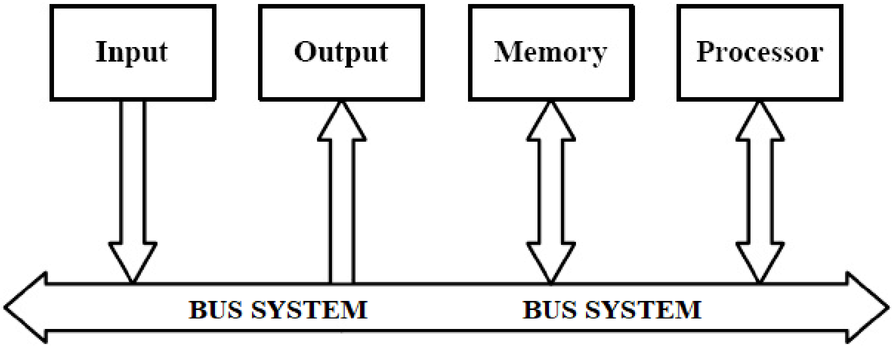
Questions and answers: Lecture-1

	Show a simple block diagram of a computer and identify its main functional units.  Input Output Memory Processor BUS SYSTEM BUS SYSTEM
	What technology is used to design main functional units of a computer? Semiconductor Technology
	What do you understand by Digital technology? In digital technology, systems are designed to work with two-states logic; called High/low or 1/0 or true/false, although in electronic implementation two different voltage levels or ranges are used (example: +5v for High, 0v for Low) to represent two logic states. Logic gates, such as AND, OR, NOT, and Flip-flops, decoders, encoders, multiplexers etc are used to design systems in digital technology.
	What do you understand by digital computer? Digital computers are designed using digital technology. Programs and data are represented by two-states logic, means using 1's and 0's. Memory and storage devices are designed to store information and programs as a string of 1's and 0's. CPU is designed to process data/information (arithmetic, logical operations) in binary. Information, programs and commands also flow/transferred among different functions units in binary forms as well. Logic gates, flip-flops and other digital logic systems are used to design all functional units of a digital computer.
	What is the basic element in CPU design? Transistor, a three terminal solid-state electronic device, is used as the basic building of CPU. Logic gates, flip-flops and other digital logic systems are designed using transistors. ON and OFF states of transistors represent two logic states.
	How arithmetic operations are performed in digital computers. Numbers are encoded in binary and arithmetic operations are performed/processed on binary representation of data.
	What are the different programming levels? High level language ----- low level (assembly) language ----- machine code. Programming in High level language does not require any knowledge on hardware rather it is independent of CPU. English words, arithmetic notations and variables are used to write programs following the syntax of the language. Programming in Low level language requires detailed information/knowledge on hardware: CPU architecture and instruction set. In Machine code, programs and data are represented in Binary strings of 1's and 0's and it also requires detailed information/knowledge on hardware
	What is an Instruction?

An instruction is a command to CPU for a basic operation. For example: add two numbers and store result to memory/another storage.

An instruction in low level language must contain information on

- Operation to be performed
- Data of sources of data
- Result field
- Other information (size of data, source of data etc) for the CPU

Show instruction format in low level language.

Operation field	Result field	Data -1 Source of data-1	Data -2 Source of data-2

What is machine code?

Machine code is binary representation of an instruction in low level language.

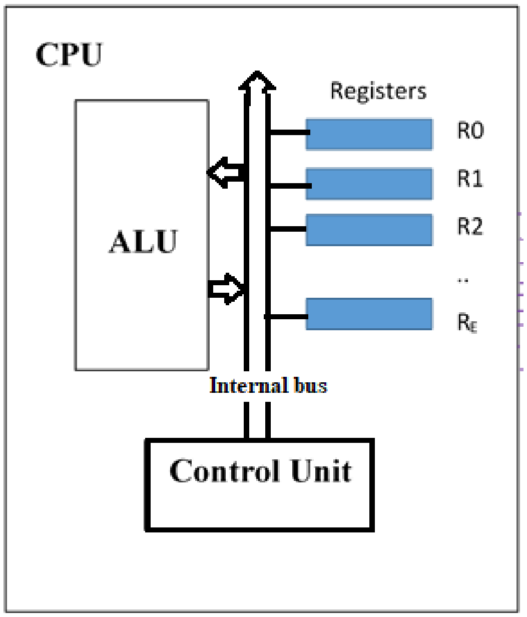
A machine code must contain all information of an instruction written in low level language but represented in binary. Moreover, machine code may contain more information required for the CPU.

A typical machine code: 0011010101111000011100

What is Instruction set?

A CPU is designed to perform only a limited numbers of basic operations and separate commands or instructions are used for basic operations. Instruction set refers to all instructions of a CPU.

Show internal architecture of a CPU.



What is a register?

A register is a high speed electronic storage within the CPU? There are a number of registers in a CPU.

What is the use of register?

CPU uses registers to hold data for arithmetic/logical operations. Registers are also used to store results.

How registers are used in low level language?

	Registers are only few in numbers, may be 8, 16, 32 so. Registers are addressed by names in low level language as assigned by CPU designers. Usually English letters and subscripts are used, for example R0, R1….. or S0, S1,….. AX, BX….. etc.
	How registers are used in machine code? By specific codes, containing 1’s and 0’s.
	What is control unit? Control unit is designed to decode machine codes of instructions and control all other sections of CPU and computer in electronic form.
	What is ALU? ALU is a functional unit of a CPU that is designed to perform all arithmetic and logical operations. ALU contains digital circuits to perform basic operations.