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COMPUTER ENGINEERING
By-VIJAY Sir

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

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GATE.

MOIT-141213 JOTUIMOL

Syllabus. GATE

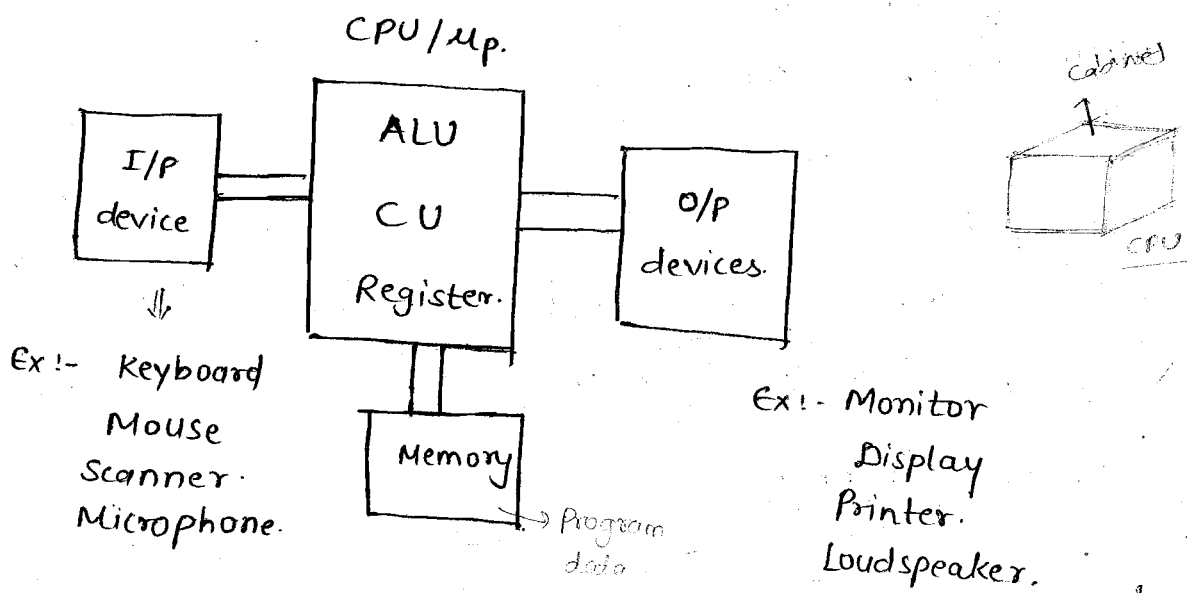
- 1) Machine Instruction and Addressing Modes.
- 2) ALU.
- 3) Data Path and control unit.
- 4) Instruction pipelining.

- Vijay Sir

* Computer purposes

- Speed in calculations.
- Data storage.
- Data movement.
- Data processing.
- Data control.

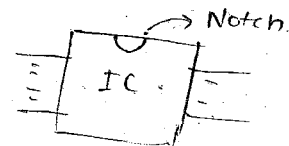
Basic block diagram of a computer.



* Microprocessor :-

It is a semiconductor component design by using VLSI technology, and it contains ALU, CU and register in a single package (IC).

Ex:- 8085, 8086, 80486.



up

I generation \rightarrow Vacuum tubes

II \rightarrow Transistor

III \rightarrow SSI { MSI : SSI \rightarrow < 10 transistor.

IV \rightarrow LSI { VLSI : MSI $\rightarrow 10 - 100$

LSI $\rightarrow 100 - 1k$

V \rightarrow VLSI

VLSI $\rightarrow > 10k$

ULSI \rightarrow

SLSI \rightarrow

Bit \rightarrow Binary digit 0/1.

Nibble \rightarrow 4 bits 0110.

Byte \rightarrow 8 bits

Word length \rightarrow (Depend on Types of up)

\rightarrow Number of bits that can be processed by a processor parallelly in the ALU.

971 - Intel 4004 \rightarrow 4 bits

Intel 8008 \rightarrow 8 bits

Intel 8080 \rightarrow 8 bits

Intel 8085 - 8 bit.

Intel 8086 - 16 bit

80186, 80286 - 16 bit

Intel 80386 - 32 bit up.

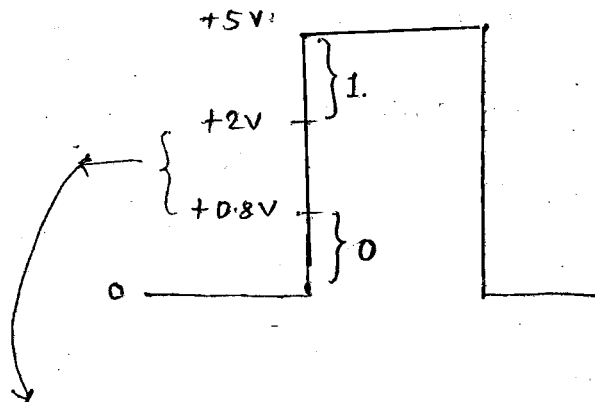
Pentium - Dual core \rightarrow 32.

Ex:- 8 bit up \rightarrow 8 bits / 1 Byte.

16 bit up \rightarrow 16 bits / 2 Bytes.

32 bit up \rightarrow 32 bits / 4 Bytes.

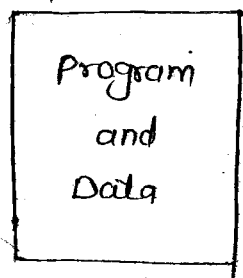
TTL \rightarrow Transistor - Transistor Logic.



Indefinite levels \rightarrow These are to be avoided by using a Tri-state buffer \rightarrow (interfacing component)

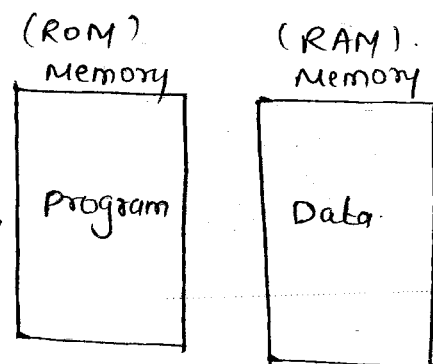
\Rightarrow Based on how programs and data are stored in memory there are two types of architecture.

- ① Von-Neumann or Princeton Architecture.
- ② Harvard Architecture.



Von-Neumann (or) Princeton Architecture.

Ex :- Intel 8086
Intel 8085



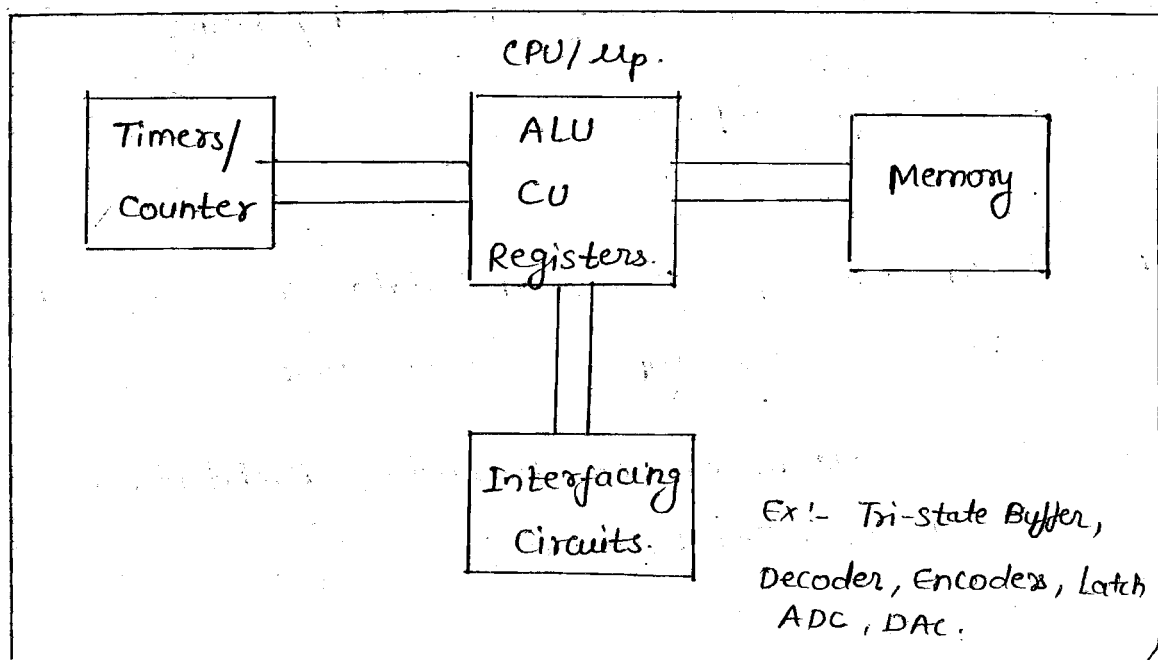
Harvard Architecture.

Ex :- Intel 8051.

\downarrow
MicroController.

Note :- For Basic microprocessor memory is connected externally for latest processors, memory can also be present in the processor to store frequently use data and instruction (inside) is known as Cache memory.

Microcontroller (on μc .



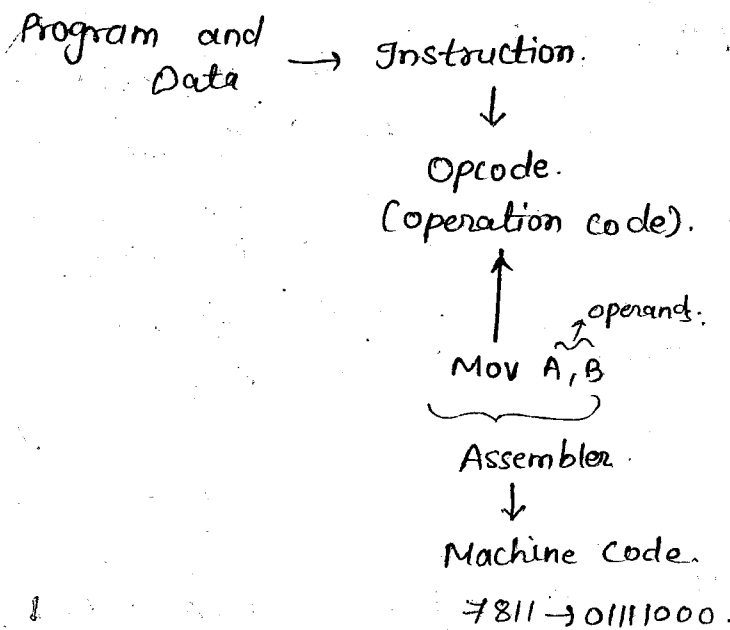
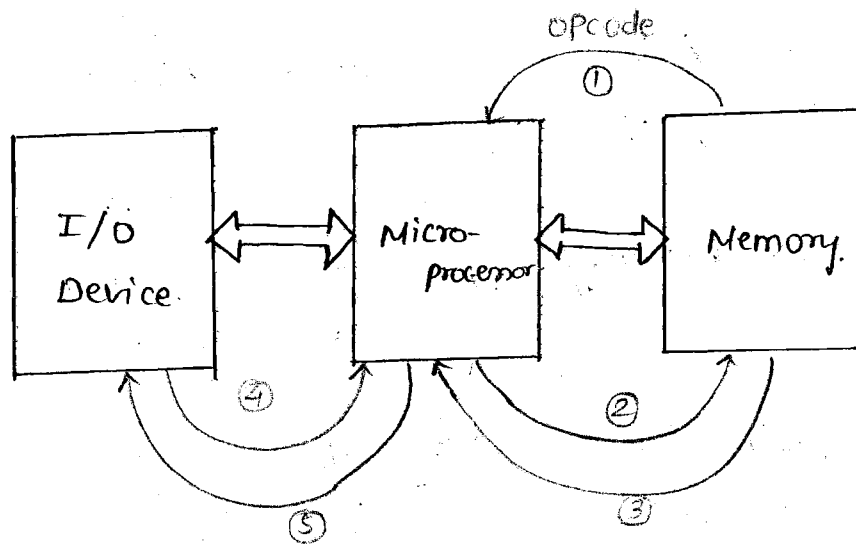
Microprocessor (up)

- (1) It contains ALU, CU and registers of up.
- (2) No internal memory
- (3) No interfacing circuits, {Timers/counters}
- (4) Used for general purpose application
- (5) Intel 8086, Intel 8085, i7, Z80, i5, Qualcomm (mobile).
Ex: Mobile application
- (6) follows Von-Neumann (or) Princeton Architecture

Microcontroller (MC)

- (1) It has ALU, CU and registers.
- (2) It has internal/on board memory.
- (3) It has interfacing circuits, Timer/counters.
- (4) Used for specific purpose applications.
- (5) Intel 8051 (8 bit), Intel 80196 (16 bit), Toshiba, PIC.
Ex: Mouse, Oven, Washing Machine.
- (6) follows Harvard's Architecture.

* Basic operation of a Microprocessor.



- ① opcode fetch
- ② Memory Read
- ③ M/M Write
- ④ I/O Read. → i/p device (or) i/p port
- ⑤ I/O Write → from up → o/p port.