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Definition ?	Meaning
Micro-Processor.	it is an IC that can perform arithmatic & logical operations & consists of only CPU.
Micro-controller	it is also an IC that consists of CPU & other ~~peripherals~~ components like RAM, ROM & i/o parts.
Embedded systems	It is special computer designed to perform one or more specific tasks with real-time constraints & power efficency constraints
Mechatronic systems	systems in which mechanical hardware is integrated with electronical software & on micro-controllers.
n-bit processor.	1- processor works only on n-bit of data at a time 2- Data larger than n-bit has to be broken int n-bits to be processed.

Comparison

Micro-processor	Micro-controller
general purpose IC which consists of only CPU	Specific purpose IC Which Consits of CPU, RAM, ROM, ... etc.
system is bulkier & less power efficient & more expensive.	system is smaller, high power efficiency & less expensive
Can be used more in many functions "more versatile"	Can be used only in its specific task

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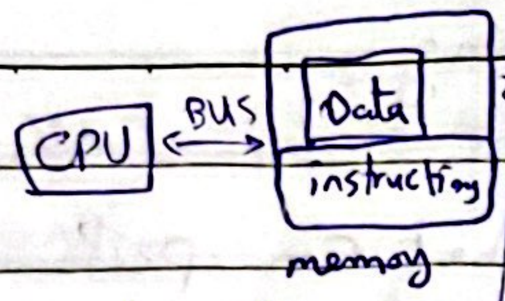
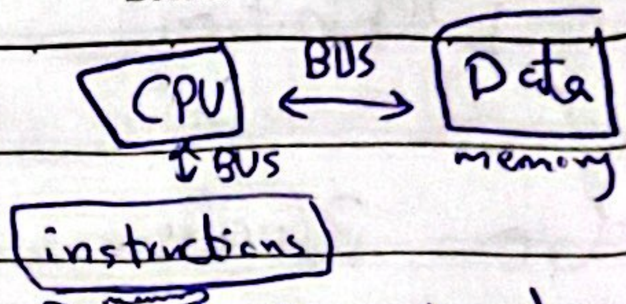
Von-neumann



- the Data memory & Bus is shared with instructions memory & Bus
- Can't access both Data memory & instructions memory simultaneously.
- Used in PCs

Harvard



- memory & Bus of Data & instructions are seperated
- Can access both simultaneously.
- Used in micro-controllers

types of ROM

① PROM (Programmable Read only memory)
- ~~of~~ Can be programmed only once.
- Can be burned using burner
- every bit has a fuse.

② EPROM (erasable programmable ROM)
- Can be programmed multiple times.
- information can be erased using UV-light.
- Cannot be erased electronically.

③ EEPROM (electrialy erasable PROM)
- Can be programmed multiple times
- information can be erased electronically.

④ Flash memory
- High density, non-volatile & electrically ~~erased~~ erasable memory.

⑤ Mask ROM
- Not user programmable.
- one time programmable
- programmed by the manufacturer.

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Types of RAM.

① Static RAM "SRAM"	② Dynamic RAM "DRAM"
- More expensive - used for speed-sensitive Cache - medium power Consumption - Fast - less Capacity (6 transistors = 1 bit) - No refreshing needed	- less expensive. - slower than SRAM - Higher Capacity (1 transistor + 1 Cap - needs refreshing due to power leakage from capacitor
used in micro-controllers due to lower power Consumption	used in PCs due to high Capacity

③ Non-Volatile RAM

- it is RAM that uses battery as back-up so that Contents are not lost after power off
- it consists of efficient SRAM cells built with CMOS Technology.
- another type of NVRAM is built comping SRAM with EEPROM where after poweroff contents are written on EEPROM & after power on contents are written again on SRAM

(Q6) because in normal operation ROM cannot be written on it by the CPU, and it needs special circumstances or special equipment to write on it.

(Q7)

Type	Volatile?	writeable?	Erase Size	Max erase Cycles	Cost (per byte)	Speed
SRAM	Yes	Yes	Byte	unlimited	expensive	Fast
DRAM	Yes	Yes	Byte	unlimited	moderate	moderate
PROM	No	once	none	zero	moderate	Fast
EPROM	No	Yes	entire chip	limited	moderate	Fast
EEPROM	No	Yes	Byte	limited	moderate	Fast: R slow: wr
Mask ROM	No	No	none	zero	inexpensive	Fast
Flash	No	Yes	sector	limited	moderate	Fast to re slow to wr
NV-RAM	No	Yes	Byte	unlimited	expensive	Fast.