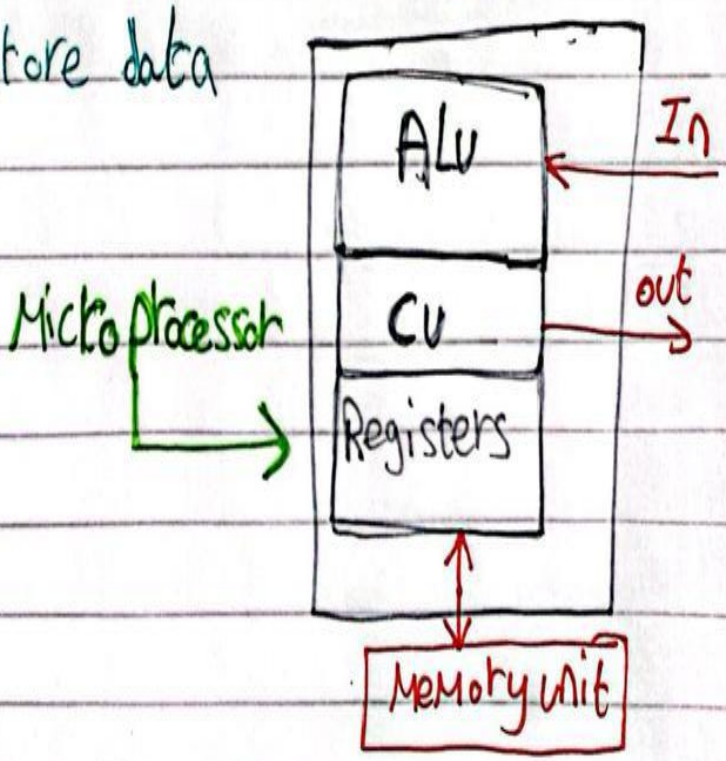
Microprocessor : is a central processing unit (cpu) that serves as the primary component of a computer responsible for executing instructions and performing arithmetic and logic operations in electronic devices

it contain :.

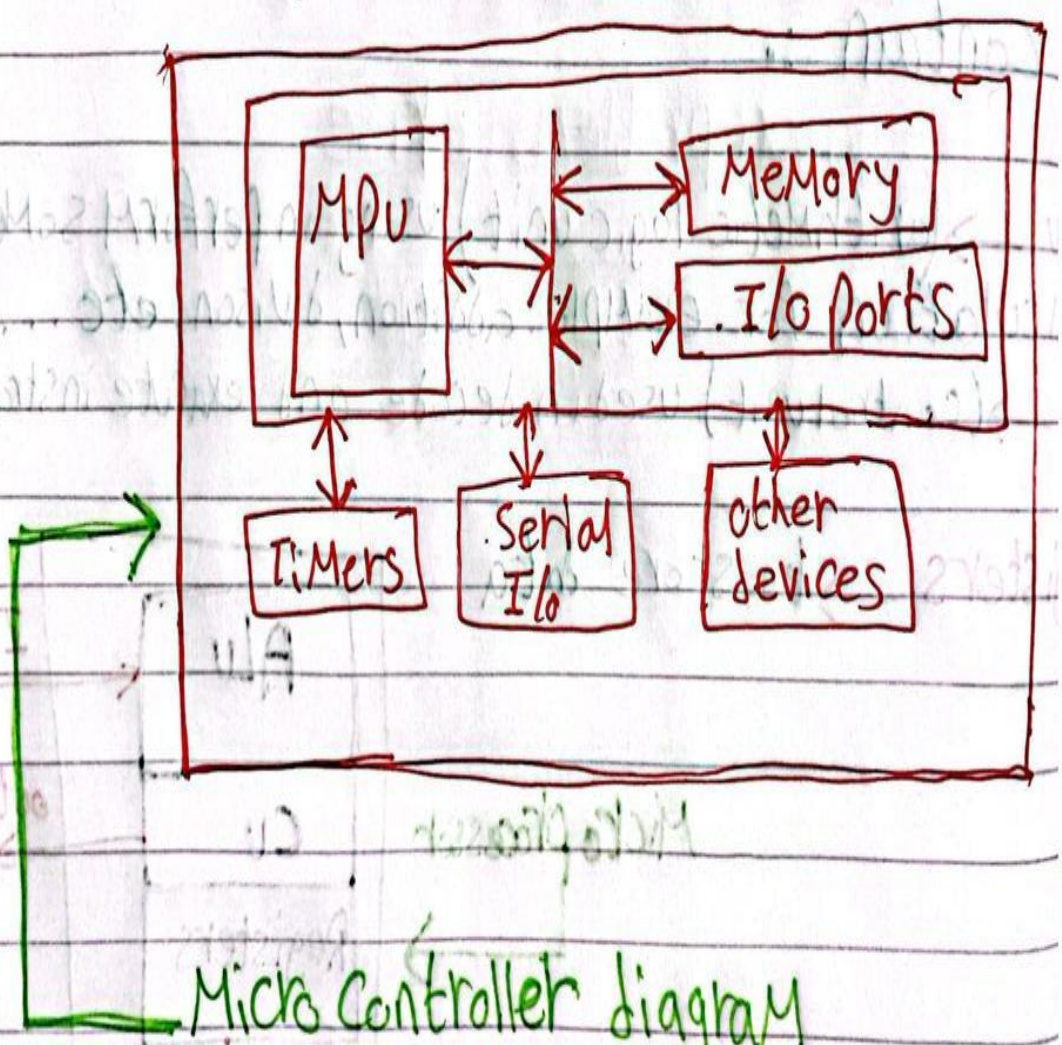
Alu → (arithmetic logic unit) using in perform some basic calculation for example: addition, divison, etc...

Cu → (control unit) used in decode and exacute instraction

Registers → to store data



Micro controller : It is a Ic contain processor Ram, Rom and Input/output ports set of different peripherals designed for embedded systems to perform a spacific task



Micro Controller diagram

embedded system : it is a limited resource computing device designed to control system with a specific functions

Micatronic system : the integration of Mechanical systems with electronics and software to create More functional and efficient products and processes

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 into n-bit pieces to be processed

Micro processor	Microcontroller
used in personal computer	used in embedded system
Cost is high	Cost is low
high power usage	low power usage
Based on von Neumann	Based on harvard
RAM, ROM, I/o units and other peripherals are not embedded on a single chip	RAM, ROM, I/o units and other peripherals are embedded on a single chip
since memory and I/o are connected externally the circuit become large in size	Since Memory and I/o are present together the internal circuit is small in size

Von Neumann Architecture :- is a digital computer architecture whose design is based on the concept of stored program computers where program data and instruction data are stored in the same memory also single bus fetches both of them

Harvard Architecture :- is a digital computer architecture whose design is based on the concept where there are separate storage and separate buses for instruction and data it was basically developed to overcome the bottleneck of von Neumann architecture

Types of ROM:

- PROM (programable ROM)

1) User can burn information into it
2) For every bit there is a fuse
3) Programmed by blowing the fuses
4) PROM programmed only once so it is called OTP (one Time programmable)
5) non-Volatile

- EPROM (Erasable programable ROM)

1) Can be programed and erased thousands time
2) widely used (eprom) called (UV eprom)
3) erased by ultra violet radiation
4) to burn on it the ROM burner uses 12.5 Volt or higher
5) one of its disadvantage that it cannot be erased while it is in the system board
6) non-Volatile

EEPROM (electrically erasable programmable ROM)

1) it use electric to erase instand of using ultra violet

2) you can select the byte to be erased

3) it can erase or programmed while it is on the board

4) it's cost is higher than eprom

5) non-volatile

Flash Memory EPROM

1) it erase by electrical Method

2) erase the entrie contents not just specific byte

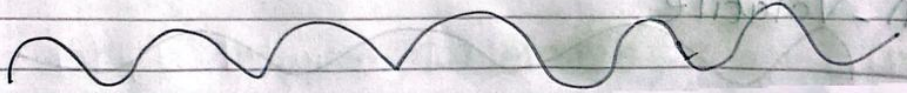
3) erase block by block

4) it can be programmed while it is in the system board

5) non-volatile

Mask RoM :

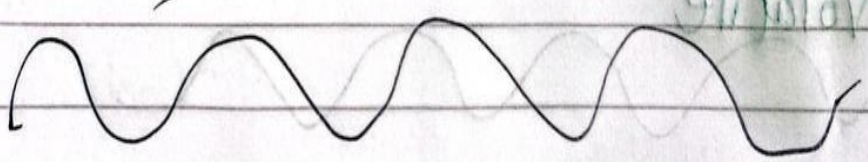
1) it is not a user programmable RoM
2) it programmed by the factory only
3) cheaper than other kinds of RoM's and one time programmed (OTP)
4) non-Volatile



Types of RAM :

SRAM (static RAM)

1). Volatile Memory
2) Made from flip-flops don't require refreshin each cell require 6 transistors this give 1-bit
3) with CMos technology can use 4 transistors



NvRaM (non volatile RAM)

1) it allow cpu to write and read on it and when the power is off the contents are not lost

2) it can store contents up to 10 years after power is off

3) use lithium battery as a backup energy source

4) it use SRAM cells built out of CMOS

DRAM (Dynamic RAM)

1) Volatile Memory

2) cheaper than SRAM

3) use capacitors as storage cells and it require constant refreshing due to charge leakage

4) while it is in refreshing data cannot access

Q6) it is referred to as RoM since in the normal operations the cpu does not have the capability to write to it

- It may be written to by an external device or there may be a special configuration within the system where in the cpu is granted access to write to it

Type	volatile	writeable	Erase size	Max erase cycle	Cost per byte	Speed
SRAM	yes	yes	Byte	unlimited	expensive	Fast
DRAM	yes	yes	Byte	unlimited	Moderate	Moderate
Masked RoM	No	No	N/A	N/A	Inexpensive	Fast
PRoM	No	once	N/A	N/A	Moderate	fast
EPRoM	No	yes	entrie chip	limited	Moderate	fast
EEPRoM	No	yes	Byte	limited	expensive	Fast to read slow to write
Flash	No	yes	Sector	Limited	Moderate	Fast to read slow to write
NVRAM	No	yes	Byte	unlimited	expensive SRAM + battery	Fast