①

Micro-Processor:

responsible for arithmetic and logical operations and have three parts:

1) (ALU) Arithmetic logic unit

2) Control unit

3) registers

1) ALU ⇒ do operations on date

2) Control unit ⇒ Coordinates direction STEPS

3) registers ⇒ Store date → special ⇒ PC, SP, IR
                          → General Purpose ⇒ $R_1, R_2, \dots R_n$

4) memory unit ⇒ (cache L1)

②

Micro Controller:

Consist of CPU Central Processing unit and Memory (ram-rom) - input - output devices (Peripher like (gpio - I_2C - Timers - ADC - DAC)

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③ Embedded System:

Small Computer which consist of hardware like micro controller and software. do a special function like: fan - keypad - touchpad

Mechatronic systems:

Collection of skills in mechanical engineering electronics, control and automation

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n-bit Processor:

indicates number of bits that CPU can processing in one cycle

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MCU ⇒ CPU + Peripherals + Memory

SoC ⇒ (High Preformance) MCU + second cores (GPUs, DSP

ECU ⇒ SoC + Sensors + Actuators + OFF-chip Controlle

Q2)

Micro Processor	Micro controller
ALU	Memory (ram-rom)
Control unit	Peripherals like GPIO
registers	Inc.
	CPU

Q3 Von-Neuman

Single memory shared by both code & data

2 set of cycle required

1 cycle for data fetch

1 cycle for instraction fetch

Pipeling is not possiable

Simple in design

Harvard Architecture

Separate memory for both code & data

Single set of clock cycle sufficient

Pipeling is possiable

Complex in design

Rom

1) PRom

it can Program once by user

2) EPRom

it can Program by user many time
cheaper than PRom
and it needs UV to erase total code

3) Misked Rom

it can Program once by manufacture

(5)

RAM

STATIC RAM

Fast

Small

expensive

6 transistors

low Power Consumption

access at any time

Dynamic RAM

Slow

large

cheaper

one transistors

High Power

can't at refresh time

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b) CPU can't writes on it but can write using external device

Type	Volatile	writeable	Erase size	max erase size	Cost Byte	Speed
SRam	Yes	Yes	Byte	unlimit	expensive	Fast
DRam	"	"	"	"	cheaper than SRam	DRam > Rom SRam > DRam
NV Ram	No	"	"	"	very expensive	Fast
PRom	"	ont time	total Code	limited	Moderate	"
EPRom	"	Yes	"	Limit	"	"
EEPRom	"	"	Byte	"	expensive	Fast to read Slow to write
Flash	"	"	"	"	Moderate	" "
Masked Rom	"	once by Manufacture	"	unlimit	cheap	Fast