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Q1: Define:

(1) Microprocessor: It's the brain of any system, It Consists of three Components (Control Unit (CU), Arithmatic logic Unit (ALU), Registers), It needs to ROM, RAM are added to it on motherboard. Microprocessor is designed to general purpose.

(2) Micro Controller: It's designed to Specific Purposes, is embedded in the system for this purpose only, It Consists of (CPU is included "CU", "ALU", and Registers beside of Rom and RAM, GPIO (general Purpose Input output) on Single Chip, It doesn't need to Mother board.

3) Embedded Systems: they are the systems that they have a specific purpose or dedicated function with optimizing size, cost, and power and constraints in real time, these systems are embedded inside (electric or electrical) devices

4) Mechatronic: It consists of four pillars, electric, mechanical system, electronic, and software systems, then combines them in one system to create integrated system for more efficient, accurate, functional process.

5) n-bit processor:
It is processor works only on n-bit of data at a time, if data is larger than n-bit, it has to be broken into n-bit pieces to be processed
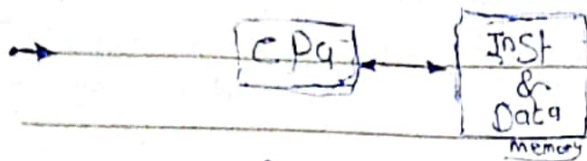
Q2: Comparison

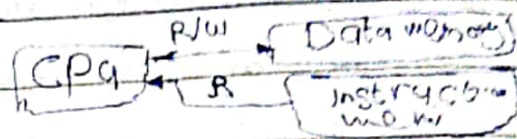| Microprocessor	Microcontroller
General purpose	Specific purpose
Contains CPU only	Contains CPU beside of ROM, RAM, etc
Higher cost	Lower cost
High power	no need to high power
has no constrains on time	has constrains on real time for critical systems
More flexible to add external features	less flexible where it is difficult to add any external features

Nawar

Q3: Comparison :

Von - Neyman	Harvad
[CPu] ← → [Inst & Data Memory]	[CPu] ← R/W → [Data memory], R → [Instruction memory]

→ No provide a pipeline feature where it has one bus to communicat with Instruction, Data Memory.

→ provide a pipeline feature where it can fetch instruction in the same time that it can decode another instruction in the same time that it can execute anoth instruction.

→ more efficient in computer with Microprocessors.

more efficient in embedded system with MicroControllers.

Q4: Types of ROM:

① Masked ROM: It's programmed by Manufacturer. It can't erase to be erased by user.

② PROM: It's blank memory and I can program it for one once, It is called "OTP"

③ EPROM: It's programmed by user, It can be erased data that is burned on it by ultra violet waves.

④ EEPROM: It can be programmed and data can be erased by electrical signals.

⑤ flash memory: is the most recent non volatile memory, data can be erased by electrical signals. but I can select block of memory to be erased only the other don't be erased.

Q5 : Types of RAM :

① SRAM (Static RAM) :

It's volatile memory that no retain data in case of power off, It consists of many cells that each cell consist of 6 transistor will no needing to refreshing time to keep data during power on.

② DRAM (Dynamic RAM)

It's volatile memory that no retain data in case of power off, It consists of many cells that each cell consist of transistor and capacitor, It needs to refreshing time to save data in case of power one, while refreshing time, its data cannot be accessed.

③ NV.RAM (Non volatile RAM)

It allows the CPU to read and write to it, when the power is off, the contents aren't lost

- one of types consists of SRAM with backup battery to retain data in case of power off
- one of type consists of SRAM with EEPROM

Q6 : why Rom is Read only memory although I can write on it ?

This is result of its composition depending almost on floating gate mosfet that we need high power to can write on it, so CPU can't write on it, but we also burner to do this, but CPU can read from it easily, because it don't need to high power

CamScanner

Q=7) fill this table:

Type	Volatile?	Writeable?	Erase Size	Max erase cycles	Cost (per Byte)	Speed
SRAM	yes	yes	Byte	Unlimited	expensive	fast
DRAM	yes	yes	Byte	Unlimited	Inexpensive / moderate	moderate
Mask Rom	no	no	N/A	N/A	inexpensive	fast
PROM	no	once, with burner	N/A	N/A	moderate	fast
EPROM	no	yes, with burner	Entire chip	Limited	moderate	fast
EEPROM	no	yes	Byte	limited	expensive	fast to read slow to write end
Flash	no	yes	Sector	limited	moderate	~
NVRAM	no	yes	Byte	unlimited	expensive	fast