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CSA

Assignment - 1

- Evolution of microprocessor:-

(1) First Generation [4-bit Microprocessor]:-

The intel corporation came out with the first generation of micro-processor in 1971. They were 4-bit processor namely Intel 4004. The speed of the processor was 740KHz having 60K instructions per second it had 2300 transistors and 16 pins inside. Built on a single chip, it was useful for simple arithmetic and logical operations. A control unit was there to understand the instructions from memory and execute the tasks.

(2) Second Generation [8-bit Microprocessor]:-

The second generation began in 1973 by Intel as the first 8-bit micro-processor. It was useful for arithmetic and logic operations on 8-bit words. The first processor was 8008 with a clock speed of 500 KHz and 50K instructions per second, followed by an 8080 micro-processor in 1974 with a speed of 2 MHz and 60K instruction per second. Lastly came with 8085 micro-processor in 197

passing an ability of 169230 instructions per second with 3MHz speed.

③→ Third Generation (16-bit Microprocessor):-

The third generation began with 80≠86-88 micro-processors in 1978 with 4.77, 8 & 10 MHz speed and 25 million instructions per second. Other important inventions were zilog - Z800, and 80286, which came out in 1982 and could run 4 million instructions per second with 68 pins inside.

④→ Fourth Generation [32-bit Microprocessor]:-

Intel was still the leader as many companis came out with 32-bit micro-processor around 1986. Their clock speed was between 16MHz to 33MHz with 27512 transistors inside.

First one was the intel 80486 microprocessor of 1986 with 16-100 MHz clock speed and 1.2 milion transistor with 8Kb of cache memory. followed by the PENTIUM microprocessor in 1993 which had 66MHz clock speed and 8-bit of cache memory.

⑤. Fifth Generation [64-bit Microprocessor]:-

Began in 1995, the Pentium processor was one of the first 64-bit processors with 1.2 GHz to 3GHz clock speed. There were 291 million transistors and 64 Gb instruction per second.

followed by 13, 15, 17 micro-processor in 2007, 2009, 2010 respectively. There were some of the key points of the generation.

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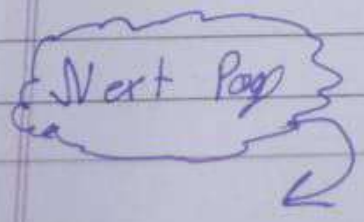
Comparision Summary of Intel microprocessor

Name of Microprocessor	Yr of Introduction	Word length	Memory addressing capacity	Pins	No of transistorised	Clock	Remarks
4004	1971	4bits	1KB	16	2300	750 KHZ	Intel's 1st
8008	1972	8bits	16KB	18	3500	800 KHz	First 8bit
8080	1973	8bits	64KB	40	6000	2MHz	Reg. 3
8085	1976	8bits	64KB	40	6500	3-6 MHz	most
8086	1978	16bits	1Mb	40	29000	5-10 MHz	First 16-bit
8088	1979	8/16bits	1Mb	40	29000	5-8 MHz	used in PC/XT
80186	1982	16bits	1Mb	68	Approx 1Lakh	5-8 MHz	
80286	1982	16bits	16MB real 4gb virtual	68	1.34Lakh	6-12.5 MHZ	PC/AT, production years
80386 DX	1985	32bits	4gb real 64TB virtual	132 PGA	2.75 lakh	20-33 MHz	First 32-bit
80386 SX	1988	16/32 bits	4gb real 64TB virtual	100	2.75 lakh	20 MHz	

80486	1989	32 bits	4GB and 64TB virtual	168 PGA	1.2 million	25-66 MHz	Supports command line to point & click
Pentium	1993	64bits	4GB 16KB cache	237 PGA	3.1 million	60-200 MHz	2 instruction at a time, supports multimedia
Pentium PRO	1995	64bits	64GB, 256K 512K, L2 cache	387 PGA	5.5 million	150MHz	Support 2nd level cache
Pentium II	1997	64bits	64GB	242	7.5 million	400MHz	Capture, share digital photos via internet
Pentium III	1999	64bits	16KL1 Data + Inst L1 inst	370 PGA	9.5 million	1GHz	E-commerce applications.
Pentium IV	2000	64bits	64GB	423 PGA	42 million	1.3-3.2 GHz	professional Processors Support 3D



Q> Subtract using 2's compliment :-

(a) $(110110)_2 - (111100)_2$

Step 1:- Find the 2's compliment of 111100 or 2nd no.

i.e,

$$\begin{array}{r} 111100 \rightarrow 000011 \\ +1 \\ \hline 000100 \end{array}$$

Step 2:- Add the 2's compliment to first no.:-

i.e,,

$$\begin{array}{r} +1 \\ 110110 \\ +000100 \\ \hline 111010 \end{array}$$

Step 3:- As there is no carry in the result so take the 2's compliment of the result and the -ve sign

i.e,

$$\begin{array}{r} +1 \\ 111010 \rightarrow 000101 \\ +1 \\ \hline 000110 \end{array}$$

$\Rightarrow -(000110)_2$

(b) $(100001)_2 - (010010)_2$

Step 1:- Find the 2's Compliment of 010010 or 2nd no:-

i.e:-

$010010 \rightarrow 101101$ (+1)

101110

Step 2:- Add the 2's compliment to first number:-

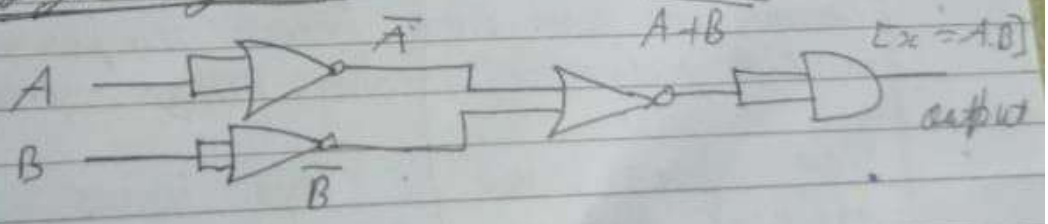
i.e.

$$\begin{array}{r} 100001 \\ +\,101110 \\ \hline 1\,001111 \end{array}$$

Step 3:- As there is a carry in the result. So, discard the carry & rest is the answer

i.e $\rightarrow (001111)_2$

A→ Logic Symbol



Q→ Write the differences b/w micro-controller and microprocessor?

Ans-

Microprocessor	Micro-controller
• A microprocessor is the CPU of a computer system, it only contains the processing unit on a chip	• A microcontroller is an integrated chip that has CPU, memory, and input/output peripherals on a single chip
• Designed for general purpose computing	• Designed for specific control-oriented tasks.
• External RAM & ROM need to be connected for operation.	• On-chip program memory and data memory are included
• Requires external hardware for I/O ports, timers etc	• Comes with built in I/O ports, timers etc.
• Operates at higher clock speeds for complex tasks	• Operates at relatively low clock speed since it is task-specific
• Consumes more power due to high performance	• Consumes less power suitable for battery-operated devices
• More expensive because additional hardware is required.	• Cheaper because everything is embedded on a single chip.

· Larger system size as multiple chips are required for full operation	· Compact in size, used for embedded systems.
· Used in personal comp, servers, high performance computing, gaming consoles etc.	· Used in home appliances, automotive systems, robotics, medical instruments etc.

Q→ Subtract using 1's compliment.

(a) $(110111)_2 - (11100)_2$

1→ find the 1's compliment of $(11100)_2$ or 2nd no :-

i.e :- 11100 → 00011

2→ Add the 1's compliment to the 1st no :-

i.e :-
```
  11 11
  11011
+ 00011
-------
  11110
```

3→ As there is no carry in the result ∴ compliment the answer and add -ve sign :-

i.e 11110 → 00001

⇒ $-(00001)_2$

(b) $(11110)_2 - (10101)_2$

1:- Find the 1's compliment of $(10101)_2$ or 2nd co:-

i.e → 01010

2:- Add it to the 1st number (1's compliment):-

i.e :-
$$\begin{array}{r} 11110 \\ +\ 01010 \\ \hline 1\,01000 \end{array}$$

3→ As there is a carry in the result to remove the carry by add it to the result:-

i.e :-
$$\begin{array}{r} 01000 \\ +\ 1 \\ \hline 01001 \end{array}$$

→ $(01001)_2$