

Disadvantages:-  
\* Limited address space

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Tut- 13

26/07/2023

Question 01

$$SOP = AB\bar{C} + A\bar{B}C + \bar{A}BC + A\bar{B}\bar{C}$$

	00	01	11	10
0			1	1
1		1		1

$$F = A\bar{C} + A\bar{B} + \bar{A}BC$$

$$Z = A\bar{C} \quad Y = A\bar{B} \quad X = \bar{A}BC$$

Question 02

$$\begin{aligned} \text{i) } F &= \bar{A}\bar{B}C + \overline{(\bar{A}B+C)} + \bar{A}\bar{B}C\bar{D} \\ &= \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C\bar{D} \\ &= \bar{A}\bar{B}(C + \bar{C}) + \bar{A}\bar{B}C\bar{D} \\ &= \bar{A}\bar{B}(1) + \bar{A}\bar{B}C\bar{D} \\ &= \bar{A}\bar{B} + \bar{A}\bar{B}C\bar{D} \end{aligned}$$

$$\begin{aligned} \text{ii) } F &= ABC + \bar{A} + A\bar{B}C \\ &= AC(B + \bar{B}) + \bar{A} \\ &= AC(1) + \bar{A} \\ &= C(A + \bar{A}) \\ &= C(1) \\ &= C \end{aligned}$$

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Question 03

- a) If the computer's opcode format were expanded to 12 bits instead of 9, and the memory address format remained the same (25 bits), what would be the new size of each instruction in bits?

$$\begin{aligned}\text{Instruction size} &= \text{opcode} + \text{Memory Address} \\ &= 12 \text{ bits} + 25 \text{ bits} \\ &= 37 \text{ bits}\end{aligned}$$

- b) Considering the updated opcode format (12 bits), how many different instructions can this computer have?

$$2^{12} = \underline{4,096 \text{ bits}}$$

- c) If the maximum memory size remains unchanged and continues to be  $2^{25}$  memory locations, what would be the new maximum memory size in terms of megabytes (MB)?

$$2^{25} / 2^{12} = \underline{2^{13} \text{ bits}}$$