

09/11/21 Tuesday

- ① $\Sigma (2, 3, 4, 5)$
- ② $\Sigma (0, 1, 2, 4, 5, 7)$
- ③ $\Sigma (0, 4, 6)$
- ④ $\Sigma (0, 1, 2, 3, 5, 7)$

⑤ Simplify $F(x, y, z) = \Sigma (0, 1, 2, 3, 7)$ by using K-map

Sol:- $F(x, y, z) = \Sigma (0, 1, 2, 3, 7)$

$xy \backslash z$	00	01	11	10
0	1	1	1	1
1			1	

$$\therefore F(x, y, z) = yz + x'$$

⑥ Simplify the Boolean function whose sum of minterms is $\Sigma (0, 1, 4, 5)$

Sol:- Let $F(x, y, z) = \Sigma (0, 1, 4, 5)$

$xy \backslash z$	00	01	11	10
0	1	1		
1	1	1		

$$\therefore F(x, y, z) = y'$$

⑦ Simplify the Boolean function

$$F(w, x, y, z) = \Sigma (0, 1, 2, 5, 8, 9, 10)$$

Sol:- $F(w, x, y, z) = \Sigma (0, 1, 2, 5, 8, 9, 10)$

$wx \backslash yz$	00	01	11	10
00	1	1		1
01		1		
11				
10	1	1		1

$$\begin{matrix} 0001 \\ 0001 \end{matrix}$$

$$x'y'z + wy'z + x'z$$

$$\therefore F(w, x, y, z) = w'y'z + wx'y + x'z'$$

Verification:-

$$\begin{array}{ccccccc} & 0 & 0 & 0 & 0 & & \\ & w'x'y'z' & + & w'x'y'z & + & w'x'y'z' & + & w'x'yz \\ & \underline{1000} & & \underline{1001} & & \underline{1010} & & \\ & + & w'xyz & + & w'xyz & + & \underline{w'xz} & \end{array}$$

0, 1, 2, 5, 7, 9, 10

$$= w'x'y'(z' + z) + wx'y(z' + z) + x'yz'(w + w)$$

$$+ w'xyz$$

$$= w'x'y' \cdot 1 + wx'y \cdot 1 + x'yz' \cdot 1 + w'xyz$$

$$= \underline{w'x'y'} + \underline{wx'y} + x'yz' + w'xyz$$

$$= (w + w')x'y' + x'yz' + w'xyz$$

$$= \underline{x'y' + x'yz' + w'xyz}$$

$$= x'(\underline{y' + yz'}) + w'xyz$$

$$= x'((y' + y) \cdot (y'z')) + w'xyz$$

$$= x'y'z' + w'xyz$$

$$= y'(\underline{x'z' + w'xz})$$

$$\begin{array}{l} w'y'z \\ + wx'y' \\ + x'z' \end{array}$$

$$= y'(\underline{(x' + w'xz)} \cdot (z' + w'xz))$$

$$= y'(\underline{x' + xw'z} \cdot (z' + w'xz))$$

$$= y'((x' + x) \cdot (x' + w'z)) \cdot ((z' + w'x) \cdot (z' + z))$$

$$= y' \cdot (x' + w'z) \cdot (z' + w'x)$$

$$= (y'x' + w'y'z)(z' + w'x)$$

$$= x'y'z' + w'xyz$$

$$\omega' y' z + \omega x' y' + x' z'$$

$$= \omega' y' z \cdot (x + x') + \omega x' y' \cdot (z + z') + x' z' \cdot (\omega + \omega')$$

$$= \omega' x y' z + \omega' x' y' z + \omega x' y' z + \omega x' y' z' + \omega x' z' + \omega' x' z'$$

$$= \omega' x y' z + \omega' x' y' z + \omega x' y' z + \omega x' y' z' + \omega x' z' (y + y') + \omega' x' z' (y + y')$$

$$= \omega' x y' z + \omega' x' y' z + \omega x' y' z + \omega x' y' z' + \omega x' y z' + \omega x' y' z' + \omega x' y' z' + \omega x' y' z' + \omega x' y z' + \omega x' y' z'$$

$$= \omega' x y' z + \omega' x' y' z + \omega x' y' z + \omega x' y' z' + \omega x' y z' + \omega x' y' z' + \omega x' y' z' + \omega x' y' z'$$

$$= 0101 + 0001 + 1001 + 1000 + 1010 + 0010 + 0000$$

$$= 5, 1, 9, 8, 10, 2, 0$$

$$\Sigma(0, 1, 2, 5, 8, 9, 10)$$