$$F = x\bar{y}\bar{z} + \bar{x}\bar{y}z + xyz + \bar{x}y\bar{z}$$

$$= \bar{x}(\bar{y}z + y\bar{z}) + x(\bar{y}\bar{z} + yz)$$

$$= \bar{x}(T) + x(\bar{T})$$

$$= \bar{x}T + x\bar{T}$$

$$= x \oplus T$$

$$\overline{\bar{y}z + y\bar{z}}$$

$$= (y+\bar{z}) \cdot (\bar{y}+z)$$

$$= y\bar{y} + yz + \bar{z}\bar{y} + \bar{z}z$$

$$= (yz + \bar{z}\bar{y})$$

$$T = \bar{y}z + y\bar{z}$$

$$T = y \oplus z$$

$$\boxed{F = x \oplus y \oplus z}$$

→ used for Even parity check.

* Quine - McCluskey Minimization Technique (Tabular Metho

- When number of input large then K-map is difficult, it use when number of variable is greater then 6.

Ex:- $Y(A,B,C,D) = \Sigma_m(0, 1, 3, 7, 8, 9, 11, 15)$

Step-1:- Re-arrange the minterms according to the number of ones in there binary pattern

0 - 0000
1 - 0001
3 - 0011
7 - 0111
8 - 1000
9 - 1001
11 - 1011
15 - 1111

Ex:- 8(1000) is placed in G1.
7(0111) is placed in G3.

Step-2:- match the minterms of adjacent group which are at unit distance and form the new group.

→ Repeat step-2 untile no further merging is possible.

Step-3:- use the implication sort and get the minimal expression and expressions.

Step-1

Group	minterm	Binary A B C D
0	M_0	0 0 0 0
1	M_1	0 0 0 1
	M_8	1 0 0 0
2	M_3	0 0 1 1
	m_9	1 0 0 1
3	m_7	0 1 1 1
	m_{11}	1 0 1 1
4	m_{15}	1 1 1 1

Step-2

Group	match pairs	Binary A B C D	
0	$m_0 - m_1$	0 0 0 –	✓
	$m_0 - m_8$	– 0 0 0	✓
1	$m_1 - m_3$	0 0 – 1	✓
	$m_1 - m_9$	– 0 0 1	✓
	$m_8 - m_9$	1 0 0 –	✓
2	$m_3 - m_7$	0 – 1 1	✓
	$m_3 - m_{11}$	– 0 1 1	✓
	$m_9 - m_{11}$	1 0 – 1	✓
3	$m_7 - m_{15}$	– 1 1 1	✓
	$m_{11} - m_{15}$	1 – 1 1	✓

Report

Group	match pairs	Binary A B C D	
0	$m_0 - m_1 - m_8 - m_9$	– 0 0 –	$\bar{B}\bar{C}$
	$m_0 - m_8 - m_1 - m_9$	– 0 0 –	
1	$m_1 - m_3 - m_9 - m_{11}$	– 0 – 1	$\bar{B}D$
	$m_1 - m_9 - m_3 - m_{11}$	– 0 – 1	
2	$m_3 - m_7 - m_{11} - m_{15}$	– – 1 1	CD
	$m_3 - m_{11} - m_7 - m_{15}$	– – 1 1	

$F = \bar{B}\bar{C} + \bar{B}D + CD$

Prime implic

P.I	minterm involved	0	1	3	7	8	9	11	15
$\bar{B}\bar{C}$	0 1 8 9	X	X			X	X		
$\bar{B}D$	1 3 9 11		X	X			X	X	
CD	3 7 11 15			X	X			X	X
	~~0 1~~								

- put a mark when find only one cross. in column.
- consider cross row as a EPI.

$F = \bar{B}\bar{C} + CD$ ($\because$ $\bar{B}D$ is eliminated)