Minterms (SOP)

- → A Minterm is an AND term in which every literal in a function occurs once
- → For n variable, there are 2^n minterm
- → Each minterm has a value of 1 for exactly one combination of value of the n variables
- → The sum of all minterms of 'f' for which 'f' assumes '1' is called Canonical sum of products

Maxterm (POS)

- → A Maxterm is an OR term in which every literal in a function occurs once
- → For n variable, there are 2^n Maxterm
- → Each Maxterm has a value of 0 for exactly one combination of value of the n variables
- → The Product of all minterms of 'f' for which 'f' assumes '0' is called Canonical Product of Sum.

example

3

$2^3 = 8$

x	y	z	Min	Designation f_1	
0	0	0	$\bar{x}\bar{y}\bar{z}$	0	m_0
0	0	1	$\bar{x}\bar{y}z$	1	m_1
0	1	0	$\bar{x}y\bar{z}$	1	m_2
0	1	1	$\bar{x}yz$	0	m_3
1	0	0	$x\bar{y}\bar{z}$	1	m_4
1	0	1	$x\bar{y}z$	0	m_5
1	1	0	$xy\bar{z}$	1	m_6

S.O.P f_1

$\{\bar{x}\bar{y}z + \bar{x}y\bar{z} + x\bar{y}\bar{z} + xy\bar{z}\}$

S.O.P

$xy + \bar{x}yz + x\bar{y}z$

1	0	1	→	$x\bar{y}z$	→ 0	m_5
1	1	0	→	$xy\bar{z}$	→ 1	m_6
1	1	1	→	xyz	→ 0	m_7

$(xy) + \ldots$ Stand S.O.P

$f = m_1 + m_2 + m_4 + m_6$

$f \to \Sigma(1,2,4,6)$

C.POS

Output	x	y	z		Max	Desig
0	0	0	0	→	$x+y+z$	M_0
1	0	0	1	→	$x+y+\bar{z}$	M_1
1	0	1	0	→	$x+\bar{y}+z$	M_2
0	0	1	1	→	$x+\bar{y}+\bar{z}$	M_3
1	1	0	0	→	$\bar{x}+y+z$	M_4
1	1	0	1	→	$\bar{x}+y+\bar{z}$	M_5
0	1	1	0	→	$\bar{x}+\bar{y}+z$	M_6
1	1	1	1	→	$\bar{x}+\bar{y}+\bar{z}$	M_7

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

$f = (M_0, M_3, M_6)$

$f = \Pi(0,3,6)$

S.POS

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

Q $f = xy + \bar{y}z$ (Stand form) → (C.P.O.S), (C.S.O.P)

$\to xy(1) + \bar{y}z(1)$

$\to xy(z+\bar{z}) + \bar{y}z(x+\bar{x})$

$\to xyz + xy\bar{z} + x\bar{y}z + \bar{x}\bar{y}z$ (C.S.O.P)

$\to \Sigma(7,6,5,1) = \Sigma(1,5,6,7)$ Ans

C.P.O.S $= \Pi(0,2,3,4)$ Ans

Q $\bar{y}z + \bar{y}x$ Stand F → (C.S.O.P)

$\to \bar{y}z(1) + \bar{y}x(1)$

$\to \bar{y}z(x+\bar{x}) + \bar{y}x(\bar{z}+z)$

$\to x\bar{y}z + \bar{x}\bar{y}z + x\bar{y}\bar{z}$

$\to \Sigma(5,1,4) = \Sigma(1,4,5)$

$\to \Pi(0,2,3,6,7)$ Ans

Q $(P+\bar{Q}\cdot\bar{R}) = $ (S.POS) → (C.POS)

$\Rightarrow (P + \overline{Q} \cdot \overline{R})$

$\Rightarrow P + \overline{Q} \cdot \overline{R} + 0$

$\Rightarrow P + \overline{Q} \cdot \overline{R} + \overline{Q} \cdot Q$

$\Rightarrow \underbrace{P}_{A} + \underbrace{\overline{Q}}_{\overline{Q}} (\underbrace{Q + R}_{B})$

$\Rightarrow$

$\Rightarrow (P + \overline{Q})(P + Q + R)$

$\Rightarrow (P + \overline{Q} + 0)(P + Q + R)$

$\Rightarrow (\underbrace{P + \overline{Q}}_{A} + \overline{R} \cdot R)(P + Q + R)$

$\Rightarrow$

$\Rightarrow (\overset{0}{P} + \overset{1}{\overline{Q}} + \overset{1}{\overline{R}})(\overset{0}{P} + \overset{1}{\overline{Q}} + \overset{0}{R})(\overset{0}{P} + \overset{0}{Q} + \overset{0}{R})$ Ans

$\Rightarrow \pi(0, 2, 3)$ Ans

$\Rightarrow \Sigma(1, 4, 5, 6, 7)$ Ans

$x + 0 = x$

$\overline{Q}(Q + R)$

$\overline{Q}Q + \overline{Q}R$

$A + \overline{Q}B \Rightarrow$

$(A + \overline{Q})(A + B)$

$A + \overline{R} \cdot R$

$(A + \overline{R})(A + R)$